

IDAHO DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

**FEDERAL AID IN FISH RESTORATION
Job Performance Report
Project F-71-R-14**



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

**Job No. 6(IF)-a. Region 6 (Idaho Falls) Mountain Lakes Investigations
Job No. 6(IF)-b. Region 6 (Idaho Falls) Lowland Lakes and Reservoirs Investigations
Job No. 6(IF)-c. Region 6 (Idaho Falls) Rivers and Streams Investigations
Job No. 6(IF)-d. Region 6 (Idaho Falls) Technical Guidance**

By

**Charles Corsi, Regional Fisheries Biologist
Steve Elie, Regional Fisheries Manager**

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Job No. 6-d. Region 6 Technical Guidance

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JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Manaaement
Investigations

Project No.: F-71-R-14

Title: Region 6 (Idaho Falls) Mountain
Lakes Investigations

Job No.: 6(IF)-a

Period Covered: July 1, 1989 to June 30. 1990

ABSTRACT

No studies or activities were conducted under this job in 1989, except for the normal hatchery supplementation for high mountain lakes on the three-year rotation.

Authors:

Steve Elle
Regional Fishery Manager

Charles Corsi
Regional Fishery Biologist

JOB PERFORMANCE REPORT

State of: Idaho Name: Regional Fishery Management Investigations

Project No.: F-71-R-14 Title: Region 6 (Idaho Falls) Lowland Lakes and Reservoirs Investigations

Job No.: 6(IF)-b

Period Covered: July 1. 1989 to June 30. 1990

ABSTRACT

Management investigations were conducted on Island Park Reservoir, Ririe Reservoir, and Mud Lake.

Angler effort, catch rates, and angler satisfaction on Island Park Reservoir have declined since 1981. Severe pool drawdown due to the continuing regional drought is the most important factor influencing the decline in the fishery. Early spring releases of fingerling rainbow trout Oncorhynchus mykiss may also have influenced trout size and catch in Island Park Reservoir. Management will modify the hatchery trout fingerling program to delay fingerling releases until June, shift June fingerling releases away from the Bills Island/Buttermilk Campground area to the West End boat ramp, and shift a portion of late spring fingerling releases to early fall sub-catchable releases.

Ririe Reservoir catch rates remain above management goals (0.7 fish/h). Hatchery catchable rainbow trout appear to provide little recruitment to the Ririe Reservoir fishery. Coho salmon O. kisutch did perform well in the Ririe Reservoir fishery, but limited availability of disease-free eggs will force the replacement of coho salmon with kokanee O. nerka kennerlyi for future supplementation of the fishery. Smallmouth bass Micropterus dolomieu continue to increase in number and size in Ririe Reservoir. Bass tournament activity is increasing on Ririe Reservoir.

Crappie Pomoxis sue. and bluegill Lepomis macrochirus introductions into Mud Lake show no sign of success to date. Tiger muskie Esox lucius E. masquinongy introductions are difficult to evaluate due to limited data and angler reports on the fishery. Yellow perch Perca flavescens and bass populations in Mud Lake appear to have strong age 0+ and age 1+ groups present in the population, but our sampling indicated few age 2+ or older yellow perch present. Legal-sized bass (> 305 mm) were absent from our 1989 samples.

Authors:

Steve Elle
Regional Fishery Manager

Charles Corsi
Regional Fishery Biologist

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INTRODUCTION

Fishery management investigations were conducted on Island Park Reservoir, Ririe Reservoir, and Mud Lake in 1989.

Island Park Reservoir

Island Park Reservoir (3,400 hectare/8,400 acres) is a popular trout fishery in southeast Idaho. In 1982, Island Park Reservoir sustained 124,442 h (36.6 h/hectare, 14.8 h/acre) of effort and a catch rate of 0.23 fish/h on a fishery supported by hatchery rainbow trout Oncorhynchus mykiss, coho salmon O. kisutch, and kokanee O. nerka kennerlyi. Island Park Reservoir provides reservoir harvest opportunity in the upper Henrys Fork Snake River drainage and, therefore, is important to the successful management of limited-harvest/trophy waters, such as Henrys Lake. A creel census was conducted during the winter and summer of 1989 to update angler effort, success, and harvest information. Reservoir tributary streams were surveyed and sampled to evaluate their contribution of spawning and rearing habitat and potential recruitment of trout and kokanee to the reservoir fishery.

Ririe Reservoir

Ririe Reservoir is a 607-hectare (1,500 acre) impoundment on Willow Creek, within 16 km of Idaho Falls. Ririe Reservoir supports a hatchery rainbow trout, cutthroat trout, O. clarki, brown trout Salmo trutta, and smallmouth bass Micropterus dolomieu fishery. Because of its proximity to Idaho Falls and other nearby communities, Ririe Reservoir receives heavy fishing pressure. Past investigations have shown that both sub-adult and adult cutthroat trout from Willow Creek overwinter in the reservoir. Those cutthroat trout may be more susceptible to harvest in the reservoir than in Willow Creek because of differing bag limits and size restrictions between the two waters.

Since smallmouth bass were introduced in 1984, a popular smallmouth bass fishery has developed on Ririe Reservoir. Project personnel conducted a stratified creel census on Ririe Reservoir in 1989 to assess angler effort, catch rates, total catch, and catch composition. The annual gill netting survey was repeated in 1989 to assess trends in species composition and abundance for game and nongame fish.

Mud Lake

Mud Lake is the terminus of the Camas Creek drainage and is managed by the Idaho Department of Fish and Game (Department) as a waterfowl production marsh and as a largemouth bass Micropterus salmoides, yellow perch Perca flavescens, and tiger muskie Esox lucius x E. masquinongy fishery. Mud Lake, a shallow, warm, and productive water, also produces large numbers of Utah chub Gila atraria and Utah sucker Catostomus ardens. During the past 20 years, the Department has attempted to establish additional warm and cool water game fish populations, including walleye Stizostedion vitreum, bluegill Lepomis macrochirus, and crappie Pomoxis sp. In 1989, we again transported to Mud Lake and conducted a limited evaluation of prior stocking of crappie, bluegill, and tiger muskie.

OBJECTIVES

1. To evaluate total angler effort, catch rates, and total harvest for the Island Park and Ririe reservoir fisheries.
2. To assess Island Park Reservoir angler opinions on the quality of fishing and preference for management of cutthroat trout or rainbow trout in Island Park Reservoir.
3. To evaluate fingerling releases of three rainbow trout strains in Island Park and Ririe reservoirs.
4. To evaluate the relative abundance of game and nongame fish in Ririe Reservoir.
5. To collect crappie for introduction into Mud Lake.
6. To evaluate the success of prior releases of tiger muskie, crappie, and bluegill into Mud Lake.

METHODS

Island Park Reservoir

Creel Census

Creel census, angler interviews, and counts were conducted from the season opener of May 28, 1989 through September 1989, and also January through March 1989. The count was stratified by month, morning, afternoon, and time of day. angler counts were made for morning, afternoon, and evening time periods. Two or three weekdays and two weekend days were counted each month, with three daily counts spaced evenly apart. Counts were also made on holidays (Memorial Day, Independence Day, and Labor Day).

Angler counts were used to calculate the mean number of anglers for each day type (weekday, weekend, and holiday). Multiplication of mean number of anglers by mean number of daylight hours for each four-week interval by number of each day type in an interval, resulted in an estimate of total hours of angler effort for each day type. Combining each day type for an interval gave the estimated angling effort for each interval.

We interviewed as many anglers as possible to document residence, type of gear, type of angler, length of fish, number and species of fish caught and kept, and hours fished.

Catch and harvest rates for each species were determined for each interval from angler interviews. This was multiplied by estimated effort to give estimated harvest and catch by species for each interval and angler type.

Experimental 60-ft monofilament gill nets were used to assess relative abundance of game and nongame fish species. Three sinking horizontal gill net sets were fished overnight in the West End fingers, opposite Bills Island and opposite the boat launch near the dam. These sets are standard locations used in previous years to monitor reservoir fish populations.

Ririe Reservoir

Creel Census

A creel census was conducted on Ririe Reservoir during the general fishing season, May 28 through November 30, 1989. The census was divided into monthly intervals. Each interval included six randomly-selected count days: three on weekends (including holidays) and three on weekdays. Counts were made three times daily from a boat from May 28 to October 1. After October 1, angler counts were conducted at Blacktail and Juniper accesses due to low water conditions. Hours of effort were estimated by multiplying mean daylight hours per day for each interval times the mean number of anglers for each day type (Moore 1980). Interviews were conducted between counts or on non-census days. Catch and harvest estimates were then obtained by applying information from interviews to effort estimates.

A subsample of anglers interviewed was also questioned on their opinions about quality and trends of the fishery, as well as if the size, number, and management programs were satisfactory.

Species Composition

Sixty-foot experimental sinking gill nets were used to assess relative abundance of game and nongame fish species. Three horizontal sinking gill nets were set on May 23. The net located at Willow Creek arm was pulled May 24. The nets located at Meadow Creek arm and at Ririe Dam were pulled May 25 due to high winds preempting work on May 24.

Bass Tournaments

Local bass clubs held six tournaments on Ririe Reservoir during 1989. A record of tournament effort and catch was compiled to monitor the trend of legal-sized bass (> 305 mm) in the fishery.

Mud Lake

Pre-spawned crappie were collected from Brownlee Reservoir on April 23, using hook-and-line and electrofishing methods, for supplemental stocking in Mud Lake. Captured crappie were transported to Mud Lake in an oxygenated transport tank within 12 h of capture.

During October, regional personnel sampled Mud Lake fish populations with boat-mounted electrofishing equipment to monitor recently released tiger muskie, crappie, and bluegill. Captured fish were measured. No other data was collected.

During January and February, we worked with the Jefferson County Sportsmen's Association and the Eagle Rock Bass Club to place approximately 150 Christmas tree bundles off the north shore between the north boat launch and Camas Creek.

RESULTS

Island Park Reservoir

Creel Census

Island Park Reservoir anglers fished an estimated 49,085 h from May 28 to September 30, 1989, less than half the 1982 effort, and the lowest effort in almost 30 years (Table 1). Peak effort occurred during the month of July, with 20,267 h being recorded. Boat anglers accounted for a little over half of the estimate, with 28,865 h, and bank anglers made up the balance, with an estimated 20,218 h.

Angler effort for the winter fishery on Island Park Reservoir was estimated to be 5,132 h for the months of January through March (Table 2).

Island Park Reservoir is closed to fishing from April 1 until Memorial Day weekend. The October 1 through December 31 period, which was opened to fishing but not surveyed, would probably account for less than 5% of the annual angling effort. The combined effort estimates for the winter and summer census were 54,217 h (16 h/hectare, 6.5 h/acre) and could be considered for practical purposes an estimate of the effort.

The estimated harvest for the summer fishery (May 28 to September 30) was 15,000 game fish. Catch rates were 0.31 fish/h. Catch rates were lowest in the May-June interval (0.09 fish/h) and highest in August (0.61 fish/h). These low catch rates are probably attributed to a combination of low drawdown (23,000 acre ft) of the Island Park Reservoir pool during 1988 and fish plants occurring only at McCrea Bridge and the dam. Because of poor weather and road conditions, fish plants were not made at the West End.

Contrasting the summer fishery catch rates, those for the winter fishery were substantially better. The overall catch rate was estimated at 0.80 fish/h with a peak of 0.96 fish/h during the month of March. The total catch was estimated at 3,585 game fish for the three-month interval.

Table 1. Island Park Reservoir summer fishery, 1960-1989.

Year	Harvest Rate	Hours Fished	Census Period
1960	0.82	75,668	June 4-October 31
1965	0.43	107,789	May 19-October 31
1967	0.54	92,949	June-October
1968	0.59	176,008	June-October
1981	0.44	70,820	May 23-October 31
1982	0.23	124,442	May 28-September 30
1989	0.30	49,085	May 27-September

Table 2. Island Park Reservoir winter fishery, 1984-1989.

Year	Harvest Rate	Hours Fished	Census Period
1984	0.53	10,000	January-February
1986	1.94	14,900	January-February
1989	0.70	5,100	January-March

Return-to-the-Creel

An estimated 17% of the catchable-sized hatchery rainbow trout stocked in 1989 were harvested in 1989. Beat estimates for the 1988 fingerling plants are 0.2%. The 1989 catch rate was 0.15 fish/h for fingerling planted in 1988. These hatchery-origin fish combined comprised about 55% of the total harvest. Wild rainbow trout comprised 44% of the harvest and provided a catch rate of 0.14 fish/h. The return-to-the-creel for coho salmon was 0.2% for 1989, accounting for 5% of the total winter catch. There were 744 kokanee caught during the winter months, contributing just 3% of the total winter catch.

The mean length of wild rainbow trout in the catch was 415 mm. Hatchery rainbow trout in the creel, planted as catchables, had a mean length of 285 mm, a large decrease in size compared to 1982. Rainbow trout planted as fingerling had a mean length of 321 mm and coho salmon were a mean length of 276 mm in the creel.

Angler Opinion Survey

Only 12% of the anglers surveyed thought the fishing trend was on the rise, while 67% felt the trend at Island Park Reservoir was decreasing (Figure 1). Sixty-one percent of the people believed the number of fish caught was substandard and 36% were satisfied with the number caught (Figure 2). However, 73% expressed satisfaction with the current management of the fishery on Island Park Reservoir (Figure 3), and 89% of the anglers thought the size of fish in the catch was good (Figure 4). Anglers were also asked whether they preferred cutthroat trout or rainbow trout in Island Park Reservoir. Preferences for cutthroat trout and rainbow trout were nearly equal at 25% and 26%, respectively, and 48% of the respondents expressed no preference (Figure 5).

Ririe Reservoir

Creel Census

Anglers fished an estimated 74,245 h (122.3 h/hectare, 49.5 h/acre) at Ririe Reservoir from May 28 through November 30, 1989 (Table 3). Bank anglers and boat anglers fished an estimated 33,564 h and 40,681 h, respectively. Fishing time averaged 2.5 h/day for bank anglers and 3.6 h/day for boat fishermen. Approximately 60% of all anglers used bait. Boat fishermen fished with lures 10 times more often than bank fishermen.

Table 3. Estimated angler effort by interval for Ririe Reservoir, 1989.

Interval	Dates	Method		Total
		Bank	Boat	
1	5/28 to 6/30	16,131	17,559	33,690
2	7/1 to 7/31	8,660	11,553	20,213
3	8/1 to 8/31	3,954	6,774	10,728
4	9/1 to 9/30	2,858	4,020	6,878
5	10/1 to 10/31	1,379	643	2,022
6	11/1 to 11/30	582	132	714
Totals		33,564	40,681	74,245

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Trend Island Park Reservoir

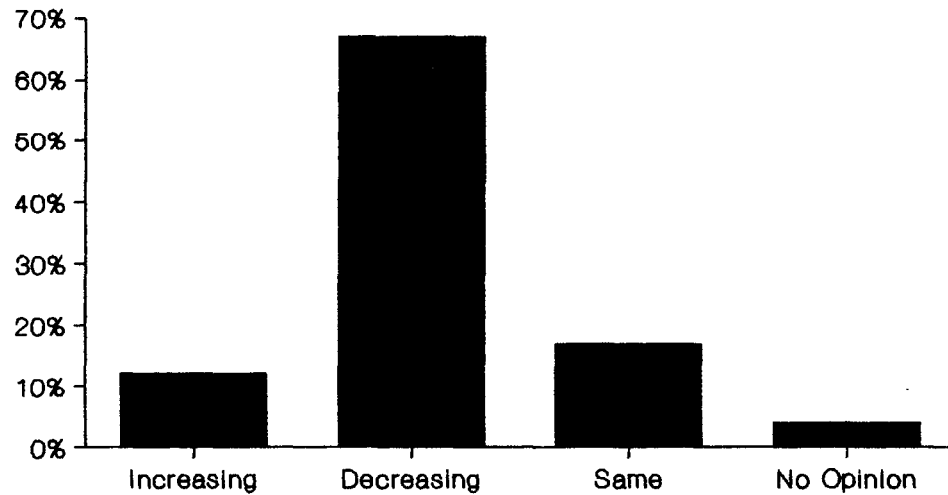


Figure 1. Island Park Reservoir angler opinions on the status of the reservoir fishery, 1989.

Fish Numbers Island Park Reservoir

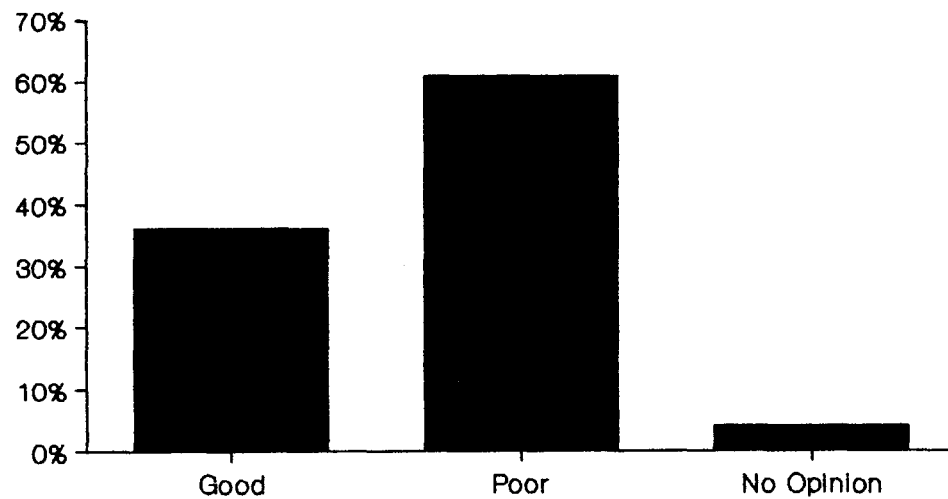


Figure 2. Island Park Reservoir angler opinions on satisfaction with numbers of trout caught in the reservoir, 1989.

Management Island Park Reservoir

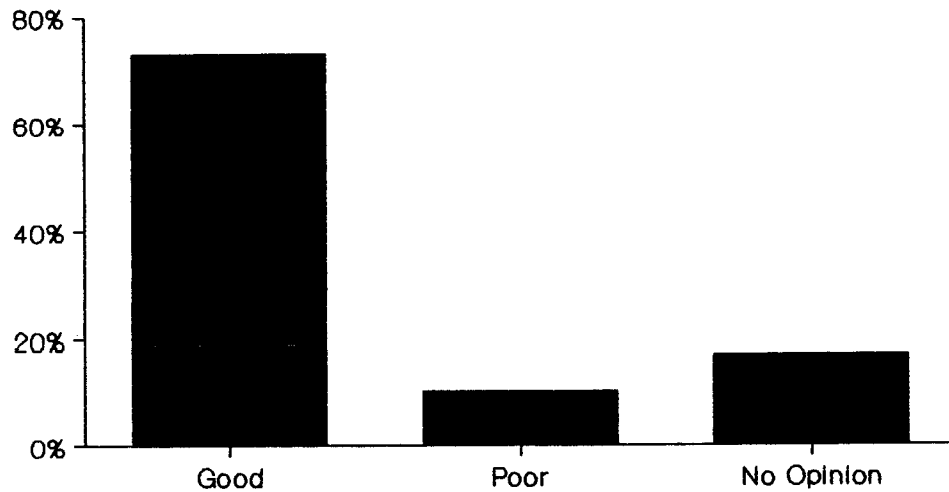


Figure 3. Island Park Reservoir angler opinions on satisfaction with the reservoir fishery management, 1989.

Fish Size Island Park Reservoir

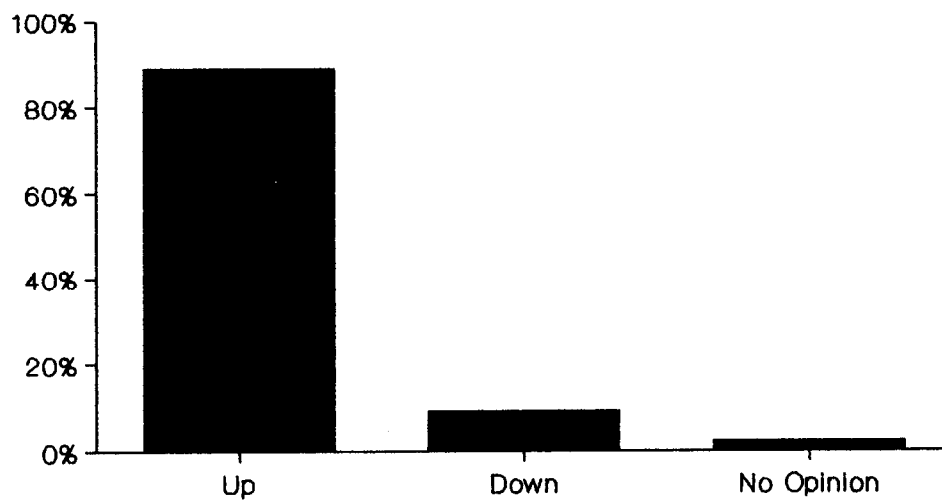


Figure 4. Island Park Reservoir angler opinions on satisfaction with the size of fish in the catch, 1989.

1989 Summer Census Interview Percentile

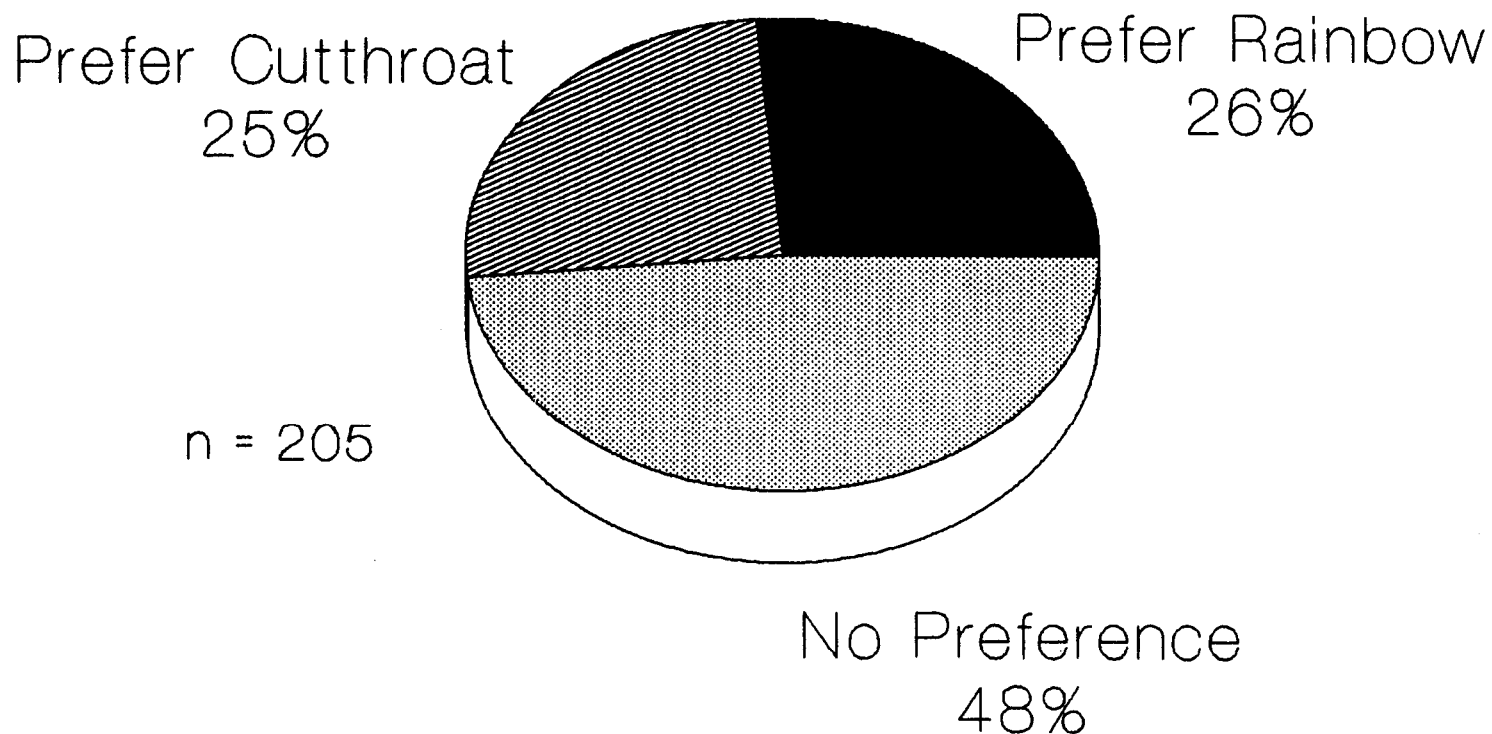


Figure 5. Island Park Reservoir angler preferences for cutthroat versus rainbow trout management, 1989.

The overall catch rate was 1.04 fish/h (Table 4). The harvest rate was 0.75 fish/h. The total catch rate for boat anglers was 1.25 fish/h, with 0.79 fish/h for bank anglers. The total catch was estimated at 77,450 game fish, of which 21,785 (28%) were released. Species composition in the creel was 65% rainbow trout, 33% coho salmon, 2% smallmouth bass, and traces of brown trout and cutthroat trout (Table 4). The harvest of 55,665 fish amounted to a yield of 92/hectare or approximately 21.3 kg/hectare.

The mean size of all rainbow trout caught and kept was 291 mm (290 mm for fingerling releases and 294 mm for catchable releases). Mean length equaled 248 mm for coho salmon and 325 mm for smallmouth bass. Rainbow trout were larger in 1989 than prior years, but coho salmon size was down slightly (Table 5.)

Return-to-the-creel for coho salmon was calculated at 17% (Table 6). The estimated harvest and return rate for coho salmon was biased upward due to high catch rates for coho salmon near the dam and applying this data to all anglers on the reservoir. Return-to-the-creel for rainbow trout was 10.9%. Our census clerk had difficulty distinguishing between catchable and fingerling-origin rainbow trout. Therefore, we could not calculate return rates for the two rainbow trout groups.

In 1988, we fin-clipped 10,000 fingerling each from three strains of rainbow trout (Hayspur, Kamloops, and generic) for evaluation of return-to-the-creel in 1989. Our census clerk could not detect any of the three fin clips in the 1989 census. We used adipose and left or right pelvic fin clips to mark fish. The ventral clips were probably not retained. We do not know why adipose marks were not observed.

Ririe Reservoir continues to be fished primarily by local residents. Thirty-six percent of the anglers asked said the trend in the fishery was up and less than 9% said it was down (Table 7). Regarding numbers of fish, 83% of the anglers said numbers had increased or stayed the same. When asked about the size of fish, 62% said size had increased, while 36% believed size had declined. Most people had no opinion on management trends for Ririe Reservoir.

Table 4. Catch rates and percent of catch composition for fish harvested in Ririe Reservoir, 1977 to 1989.

Year	Effort (hours)	Catch Composition (%)					Harvest Rate (fish/hour)
		Rainbow	Cutthroat	Brown	Coho	Smallmouth	
1977	117,202	76	11	12.0	1	--	0.68
1978	133,923	59	16	2.0	23	--	0.58
1979	146,280	75	5	0.2	19	--	0.64
1982	137,017	71	1	0.2	28	--	0.58
1986	61,910	78	2	0.2	19	0.2	0.71
1989	74,245	65	trace	trace	33	2.0	0.75

Table 5. Mean total length (mm) of fish harvested in Ririe Reservoir, 1977 to 1989.

Year	Species				
	Rainbow Trout	Cutthroat Trout	Brown Trout	Coho Salmon	Smallmouth Bass
1977	267	323	320	236	
1978	277	325	338	251	
1979	292	348	305	284	
1982	287	358	315	251	
1986	264	303	399	259	
1989	291	--	--	248	325

Table 6. Estimated return-to-the-creel of fish stocked in Ririe Reservoir, 1989.

Year	Stocked in census year	Stocked in year previous to census year	
	Rainbow trout Catchables	Rainbow trout Fingerling	Coho salmon Fingerling
1982	37.4%	8.0%	14.5%
1986	29.0%	1.8%	10.2%
1989°			17.0%

°Total for fingerling and catchable origin releases.

Table 7. Angler opinions of trends in fishery and management direction for Ririe Reservoir. (Interviews from summer 1989.)

Question	Response	Percent of sample
Trend in fishery?	Increase	36
	Decrease	9
	No change	29
	No opinion	26
Size of fish caught?	Increase	14
	Decrease	36
	No change	48
	No opinion	2
Number of fish caught?	Increase	40
	Decrease	14
	No change	43
	No opinion	3
Management direction?	Support management	29
	Change management	9
	No opinion	62

Species Composition

The gill net catch rate for nongame fish was much higher in 1989, compared to prior years (Table 8). The Meadow Creek arm and dam sets were fished for two days, versus the preferred one-day sets, due to bad weather. Net length was reduced from 120 ft to 60 ft in 1988 through 1989. Numbers of trout were nearly equal to past seasons at the dam and Willow Creek arm, but were much lower in Meadow Creek arm. Numbers of cutthroat trout netted continued to show a sharp decline compared to 1985 through 1987. We captured smallmouth bass at the dam and Meadow Creek arm.

Bass Tournaments

Local bass clubs held six tournaments at Ririe Reservoir from June 25 to September 24, 1989 (Table 9). Overall catch rates of legal-sized bass ranged from 9.0 h/fish to 36.0 h/fish for each tournament date. Most legal bass are still the result of transplants from 1984 through 1986. Legal fish (> 305 mm) from natural recruitment should begin to be caught in 1990.

Table 8. Numbers of fish captured in spring gill netting surveys (one per night per station) in Ririe Reservoir, 1983 to 1989. (Note: length of experimental gill nets reduced from 120 ft to 60 ft in 1988 and 1989).

Location	Year	Species*					US	UC	SMB
		RBT	CT	BRN	COHO				
Across from Juniper (vertical)	1983	14	1	1			52	24	
	1984	--	--	1			14	--	
	1985						85		
	1986			--	--		7		
	1987			Discontinued					
Willow Creek Arm (horizontal)	1984	--	--		--		23	5	
	1985	9	13		--		26	86	
	1986	61	15		1		60	126	
	1987	32	7		1		26	242	1
	1988	12	1		--		59	88	
	1989	12	--		1		63	326	
Meadow Creek Arm (horizontal)	1984	2	5	--	--		16	3	
	1985	--	2	2			1	73	
	1986	5	6	2			1	73	
	1987	14	7		3		49	246	6
	1988	7	2		--		13	54	--
	1989 ^a	1	1	1	--		69	393	4
Dam (horizontal)	1986	1		10	10		--	5	--
	1987	17	6	1	1		64	81	1
	1988	6	2	3	3		24	49	--
	1989 ¹	8		2	2		28	156	3

^aNets left out one extra day due to poor weather.

*RBT = rainbow trout CT
 = cutthroat trout BRN
 = brown trout
 COHO = coho salmon
 US = Utah sucker
 UC = Utah chub
 SMB = smallmouth bass

Table 9. Bass tournament catch summaries for Ririe Reservoir and Mud Lake in 1989, as reported on mandatory angler report cards.

Date	Water body	Number of Anglers	Number of Legal bass	Mean Weight (lb)	Catch rate (h/legal bass)
5/06	Mud Lake	11	12	2.8	8.3
5/27	Mud Lake	12	12	2.6	9.0
5/28	Mud Lake	3	3	2.0	9.0
6/17	Mud Lake	8	8	2.0	9.0
6/25	Ririe Res.	12	3	1.7	36.0
7/15	Ririe Res.	11	10	2.0	9.9
7/29	Ririe Res.	9	5	1.9	16.2
8/05	Ririe Res.	12	7	2.1	15.4
9/23	Ririe Res.	35	25	1.8	12.6
9/24	Ririe Res.	27	15	1.9	16.2

Mud Lake

Approximately 650 crappie were collected and transported from Brownlee Reservoir to Mud Lake for release on April 24. Although several age groups were included in this release, the majority of those crappie were pre-spawned adults.

Project personnel captured 131 yellow perch, 34 largemouth bass, 4 brown bullhead Ameiurus nebulosus, and 4 bluegill in two hours of daylight electrofishing on October 20. Yellow perch size distribution in 1989 (mean length = 99 mm) was similar to that measured in 1988 (mean length = 108 mm) (Figure 6). The largemouth bass size distribution in 1989 (mean length = 131 mm) lacked the larger fish we observed in 1988 (mean length = 120 mm), but did not differ substantially between years (Figure 7). Bluegill captured in 1989 were 67 mm, 67 mm, 103 mm, and 140 mm in length.

No crappie or tiger muskie were captured during our electrofishing effort; however, anglers reported catching tiger muskie between 22-in and 28-in during the 1989-1990 ice fishery.

DISCUSSION

Island Park Reservoir

As noted earlier, the Island Park Reservoir fishery has fallen below management goals, in terms of catch rates, for all managed species. This was reflected in the sharp decline in angler effort on Island Park Reservoir in 1989.

The poor fishing in 1989 was due to two factors: 1) pool drawdown (drought demands on system water storage) with unavoidable flushing of stocked trout and salmon; and 2) the unavailability of hatchery fish at the optimum time of release in the spring to coincide with the spring plankton bloom. Of the two factors limiting the fishery, severe pool drawdown in drought years is the most serious and least controllable. A severe drawdown such as we had in 1988 will result in pool retention of stocked fish in the reservoir and severely affect the Island Park Reservoir fishery in following years. Our ability to respond to this type of management setback will likely be limited to supplemental late spring hatchery catchable trout releases until hatchery fingerling have recruited into the fishery again.

During 1990, we will use a combination of spring rainbow trout fingerling releases and fall releases of rainbow trout x cutthroat trout fingerling. Until we are able to find hatchery space to hold fingerling until late May/early June, we will have to accept less than optimal survival and growth of our spring-released fingerling. Using hybrid fingerling for fall release will take advantage of the fall turnover and subsequent plankton bloom, and will stagger fingerling recruitment to the fishery. Use of spring-spawning rainbow trout or cutthroat trout fingerling is also an option; however, spring-spawning hatchery rainbow trout stocks are not readily available and public concerns about cutthroat trout compatibility with naturalized rainbow trout in the Henrys Fork will restrict fall releases to hybrids for the near-term.

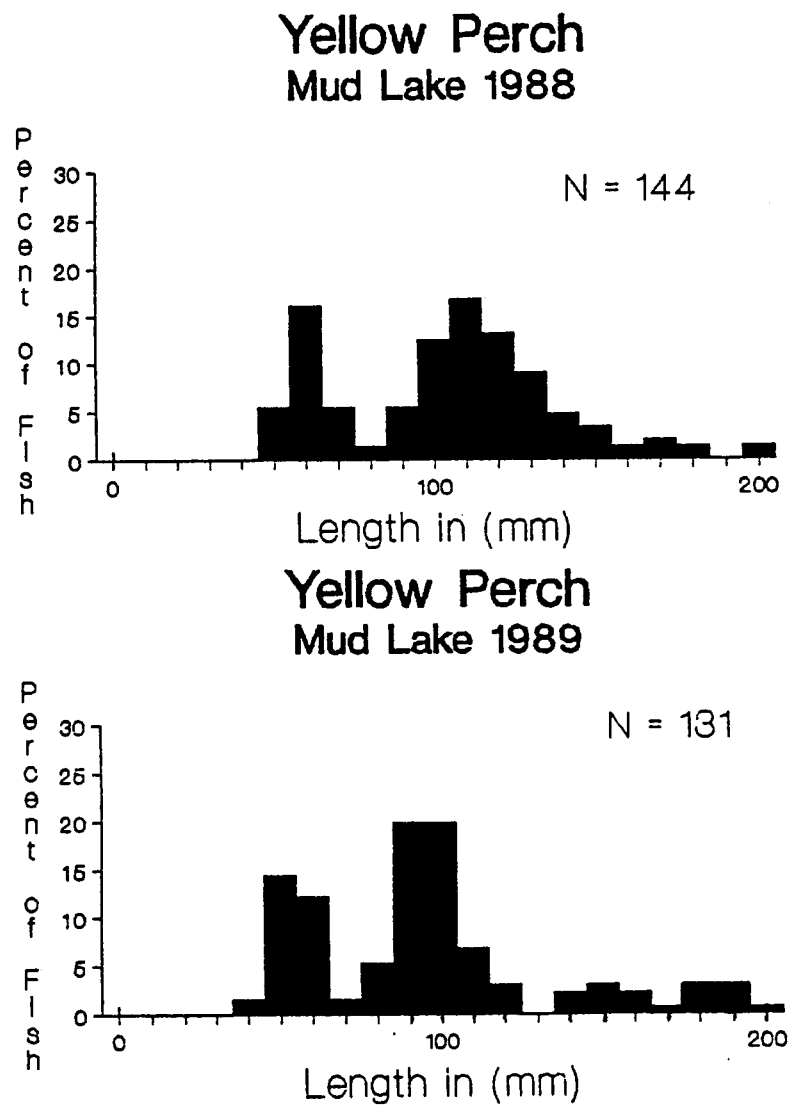
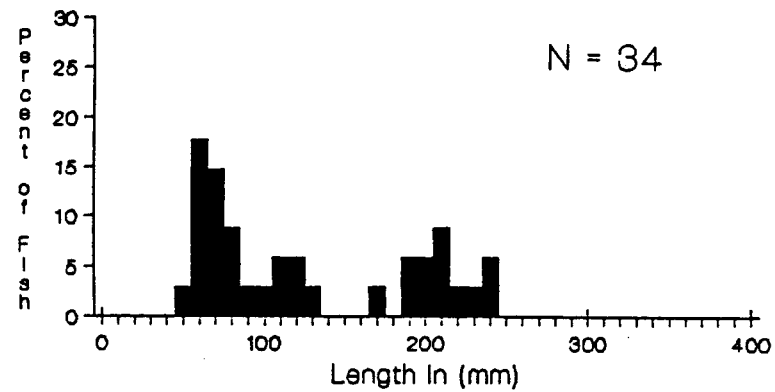


Figure 6. Length frequencies of yellow perch from Mud Lake in 1988 and 1989.

Large Mouth Bass Mud Lake 1989



Large Mouth Bass Mud Lake 1988

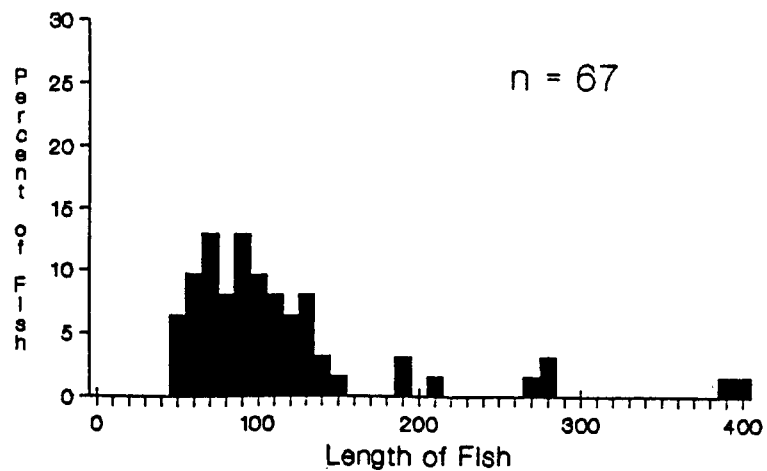


Figure 7. Length frequencies of largemouth bass from Mud Lake in 1988 and 1989.

Mud Lake

Samples of game fish populations in Mud Lake showed few changes from 1988 samples. Yellow perch were small (< 200 mm), but appear to be represented by strong age 0+ and age 1+ groups. Samples from both 1988 and 1989 are indicative of poor production. Yellow perch are exploited primarily during the winter ice fishery. The 1988 and 1989 ice fisheries were generally poor. Reports and angler checks indicated size and catch rates were low.

Largemouth bass, though long established in Mud Lake, continue to exist in relatively low densities. The 1989 samples suggest legal-sized (> 305 mm) fish may have declined in relative numbers, but sample size was too low to make any firm conclusions. Stronger age 0+ and 1+ groups were indicated. Variable year class strength in yellow perch and largemouth bass populations indicate marginal suitability of Mud Lake for those species.

The most disappointing observation was the lack of bluegill, crappie, and tiger muskie in our samples. Though we did collect four bluegill, the lack of both crappie and bluegill, relative to bass and yellow perch numbers, suggests previous transplants have not successfully reproduced. We believe the 1987 to 1989 releases of crappie in Mud Lake were sufficient to successfully seed the lake. Prior attempts to pioneer crappie into Mud Lake have been unsuccessful for unknown reasons. Monitoring and evaluation over the next two to three years will determine the success of this release. If this attempt does not prove successful, we will recommend no further attempts be made to establish a crappie population.

The lack of tiger muskie should not be interpreted as an indication of low survival or an absence of those fish from Mud Lake. Esocidae are notoriously difficult to capture by electrofishing. Trap netting and angler reports may provide more reliable assessment of the success of the tiger muskie program. Further evaluation during the next three years will be necessary to adequately evaluate these introductions.

Ririe Reservoir

Catch rates at Ririe Reservoir remained well above the goal of 0.7 fish/h in 1989. With the improved catch rates and larger size of harvested rainbow trout, effort increased from 1986.

Few of the rainbow trout harvested were identified as hatchery catchable origin (target stocking size of 8-in to 10-in). This may have been due to release of smaller catchables in 1989 (6-in to 8-in) or possibly poor survival of catchable releases. If, in fact, catchables represented a minor portion of the harvest, we may have the flexibility to reduce catchable releases without impacting the overall catch rate. Beginning in 1991, we will evaluate return-to-the-creel of catchable-sized hatchery rainbow trout that meet the 8-in to 10-in minimum size goal of release.

Coho salmon continue to recruit to the fishery at approximately 250 mm. Although the return rate (17%) is acceptable, we continued to see no fish living to age 3 and growing to 405 mm or larger. The lack of disease-free egg sources for coho salmon limits the continued availability for stocking into Ririe Reservoir. Beginning in 1990, we will experiment with replacing coho salmon with kokanee to evaluate the potential for producing age 3 and age 4 kokanee that will grow larger than coho salmon presently do.

The smallmouth bass population continues to expand. In 1989, we observed legal fish in the harvest which we believe resulted from natural recruitment. Both organized clubs involved in tournament fishing and general sportsmen have targeted Ririe Reservoir for smallmouth bass.

RECOMMENDATIONS

1. Evaluate return-to-the-creel for catchable-sized rainbow trout in Ririe Reservoir.
2. Replace coho salmon with kokanee for hatchery supplementation of Ririe Reservoir.
3. Evaluate survival and reproduction of crappie in Mud Lake.
4. Modify the hatchery program for Island Park Reservoir, including: a) delay fingerling release until June to coincide with higher temperatures; and b) release all June fingerling at the West End boat ramp.

JOB PERFORMANCE REPORT

State of: Idaho Name: Regional Fishery Management Investigations
Project No.: F-71-R-14 Title: Region 6 (Idaho Falls) Rivers and Streams Investigations
Job No.: 6(IF)-c

Period Covered: July 1. 1989 to June 30. 1990

ABSTRACT

A population estimate completed on Falls River, downstream from Kirkham Bridge, indicates a healthy self-sustaining population of wild rainbow trout *Oncorhynchus mykiss*. Attempts at population monitoring from Sheep Falls downstream failed, but rainbow trout observed were smaller and fewer in number, compared to the section below Kirkham Bridge. Estimated return-to-the-creel for hatchery catchable rainbow trout equaled 10% (range 5% to 17%), based on returns of reward tags.

Low numbers of trout were observed in Falls River tributaries. Fish passage barriers exist in Squirrel Creek. Conant Creek downstream of the Forest boundary has been degraded due to irrigation withdrawals and livestock use.

Tributaries to Island Park Reservoir contain primarily brook trout *Salvelinus fontinalis*, as in past years. Habitat degradation, including impassable diversion dams, irrigation withdrawals, and overgrazing are severely limiting tributary spawning and rearing potential. Long-term habitat improvement would greatly enhance the potential of these tributaries to produce trout for Island Park Reservoir.

A population estimate for wild rainbow trout (age 1+ and older) in the Henrys Fork Box Canyon section was 5,442 fish (177/hectare) in 1989, compared to 13,434 (554/hectare) rainbow trout in 1987. We believe low flows and severe icing during February 1989 caused high mortalities in age 0 and age 1+ fish.

Data from 1988 indicates fishing harvest in the Henrys Fork from Warm River to Ashton Reservoir may be limiting the rainbow trout population. Sampling in the Henrys Fork from Mesa Falls to Warm River (area of limited access) indicates a larger proportion of rainbow trout over 300 mm. The data indicates harvest restrictions from Warm River to Ashton Reservoir would increase numbers and size of rainbow trout.

Fish populations in the South Fork Snake River continue to be impacted by low winter flow releases from Palisades Dam. At the Conant Valley site, we observed similar total cutthroat trout *O. clarki* densities, compared to 1988 data. At Conant Valley, cutthroat trout 250 mm to 330 mm (age 2+) showed a 65% decline, compared to 1988, and 1989 estimates represented a 70% decline from 1986. Overall, cutthroat trout densities at the Lorenzo site declined to 23/hectare in 1989 from 52/hectare in 1987. The decline at Lorenzo is due to a combination of winter low flows and over-harvest. Only the Palisades site had an increase in cutthroat trout, which we believe is directly due to restricted cutthroat trout harvest beginning in 1988. Cutthroat trout mean size and the percent of cutthroat trout exceeding 405 mm increased in 1989. We believe this

shift is partially due to the lack of juvenile cutthroat trout present in the South Fork. The annual brown trout Salmo truttaredd count was 574, up slightly from 1987 and 1988.

Sampling of Willow Creek tributaries indicated a continued decline of cutthroat trout. Continued drought impacts are believed to be causing the declines.

Based on reward tag evaluations, return-to-the-creel for hatchery catchable rainbow trout was 32% and 37% from the Snake River through Idaho Falls and the Gem State Reservoir, respectively. Low returns to sites occurred for fish released in April. A high percentage of tagged fish released in Gem State Reservoir were caught in the Snake River below the dam. Approximately 50% of the harvest of tagged rainbow trout from both sites occurred after January 1, 1990, indicating a good overwinter survival.

Authors:

Steve Elle
Regional Fishery Manager

Charles Corsi
Regional Fishery Biologist

INTRODUCTION

Management investigations were conducted on the Falls River, the South Fork of Snake River, the Henrys Fork Snake River, and selected tributaries of Willow Creek and Island Park Reservoir.

Falls River

Falls River is a large tributary to the Henrys Fork Snake River with a fishery based almost entirely on wild rainbow trout Oncorhynchus mykiss, with mountain whitefish Prosopium williamsoni and remnant numbers of Yellowstone cutthroat trout O. clarki bouvieri also occurring. Currently, two low head hydroelectric generating projects are being proposed for construction on Falls River, which, if implemented, would affect approximately 16 km of the river in Idaho.

These development proposals and the likelihood that Falls River will support expanding fishing effort as the state's population increases, underscore the need for an adequate baseline fish population data base. Falls River has not been surveyed previous to 1989.

Henrys Fork

The Henrys Fork from Ashton Dam upstream to Island Park Dam has been managed on a wild trout basis (no catchable rainbow trout) since the late 1970s. The upper section from Riverside Campground to Island Park Dam has been managed under restricted harvest regulations, including three trout under 12-in and one over 20-in from 1978 to 1987, and catch-and-release during 1988 and 1989. The lower section, Ashton Dam to Riverside Campground, has been managed under the general harvest limit of six trout.

The Henrys Fork is a popular fishery and certain sections receive high levels of effort. The section from Ashton Dam to Warm River has good float boat access. The upper half of this section is paralleled by a county road. From Warm River to lower Mesa Falls, access is via trail and a 500-ft boat slide below the lower falls. In 1988 (Corsi and Elie in press), we collected the first population estimate from the Ashton Reservoir to Warm River section. Compared to the Henrys Fork below Ashton Dam, the section above the reservoir had lower total densities of rainbow trout and fewer large fish. During 1989, we sampled the section from Mesa Falls to Warm River to evaluate the fishery under a lower level of exploitation. This information would provide insight on what population response special regulations might provide if imposed on the Ashton Reservoir to Warm River section where we believe over-harvest is limiting the fishery.

During 1987 and 1988, southern Idaho experienced consecutive drought years. Water storage at Island Park Reservoir was heavily used during the irrigation season and natural base flows of the Henrys Fork were lower than normal. As a result, winter flow releases were reduced from a normal 9 to 11 m³/s (300 to 400 cfs) to a low of 2.5 m³/s (85 cfs) during winter 1988-89. Ron Smith (personal communication) documented mortalities of juvenile rainbow trout in the Henrys Fork at Last Chance during the low flows following an extremely cold period of winter 1989.

During May 1989, we completed a population estimate in the Henrys Fork Box Canyon section from Buffalo River to Last Chance. Data collected would be compared to a 1987 estimate from the same area to calculate winter icing impacts to older trout and to review the population size structure following one season of catch-and-release regulation.

South Fork Snake River

The South Fork of the Snake River is managed as a wild cutthroat trout and brown trout *Salmo trutta* fishery. Since 1984, cutthroat trout have been managed under a restricted-harvest two cutthroat trout limit, none between 10-in to 16-in, for the river section from Heise to Irwin. In 1988, the section from Irwin to Palisades Dam was added to the cutthroat trout management section. The result of these regulations has been limited harvest of cutthroat trout prior to size at first spawning (300 mm to 350 mm) and an increase in overall cutthroat trout population densities and numbers of trophy-sized cutthroat trout (> 400 mm).

Brown trout were introduced to the South Fork in the 1950s and currently are a naturally self-sustaining population. The South Fork produces trophy brown trout with the current state record (26 lb, 6 oz) caught in 1981. No special harvest restrictions are in effect for brown trout.

Drought conditions described for the Henrys Fork also affected the South Fork during 1987 and 1988. In order to refill irrigation storage, flows were reduced to 22 m³/s (750 cfs) during November through March of both years, compared with 65 m³/s normal winter releases. Flow reductions caused reduction of cover for juvenile trout and whitefish, as well as extensive losses due to stranding in side channels isolated at lower flows. The effects of flow reduction have been major mortalities to age 0 and age 1+ salmonids.

Willow Creek

Willow Creek, tributary to the main Snake River, was inventoried from 1982 to 1984 (Corsi 1986) and surveyed again in 1987 (Corsi and Elie 1989) to evaluate the response of the cutthroat trout population to the delayed opening of the fishing season on spawning tributaries. Homer Creek, tributary to Willow Creek was also surveyed to evaluate the success of 1986 fingerling cutthroat trout plants.

Five Willow Creek tributaries (Cellars Creek, Lava Creek, Corral Creek, Homer Creek, and Sawmill Creek) were surveyed in 1989 to monitor the status of cutthroat trout populations and changes since the original inventory work conducted by Corsi. The 1989 observations were also intended to provide a baseline for monitoring population responses to the Area 6 cutthroat trout regulation being implemented in 1990 (2 cutthroat trout, none between 8-in and 16-in).

Island Park Reservoir Tributaries

Small stream tributaries to Island Park Reservoir support resident wild rainbow trout and brook trout *Salvelinus fontinalis* populations and, in some cases, have the potential to provide an unknown quantity of spawning and rearing habitat for reservoir populations of kokanee *O. nerka kennerlyi* and rainbow trout. Five tributaries (Sheridan Creek, Icehouse Creek, Hotel Creek, Sheep Creek, and Harrison Springs Creek) were surveyed in 1989 to assess species composition, population densities, and habitat potential to provide production and recruitment of juvenile trout and salmon to the reservoir.

OBJECTIVES

1. Collect baseline data to estimate trout densities, species composition, and size distribution in Falls River and its tributaries.

2. Assess trout habitat quality and trout production potential in selected tributaries to Island Park Reservoir and Falls River.
3. Evaluate hatchery rainbow trout releases in Falls River.
4. Assess impacts of low winter flow and special harvest regulations on rainbow trout populations in the Henrys Fork below Island Park Reservoir.
5. Assess the trout population structure in the Henrys Fork from Mesa Falls to Warm River for comparison with the Warm River to Ashton Reservoir section.
6. Monitor South Fork Snake River fish populations in response to winter flow reductions and special harvest regulations. Use this information to formulate management recommendations to reduce the impacts of winter storage management.
7. Evaluate hatchery rainbow trout releases in the Snake River in the Idaho Falls area.
8. Implement projects which improve habitat for fish.

METHODS

Falls River Drainage

Trout Population Estimates

Trout population estimates were attempted on three sections of the Falls River between Sheep Falls and the Enterprise Canal diversion. We used two drift boats with Coffelt WP-15 electrofishing units powered by Honda 5000 generators and boom-mounted anodes to sample the section. Trout and whitefish were marked with a caudal fin clip during two days of marking. One week later, trout and whitefish were sampled during a one-day recapture effort. Estimates were recalculated in the same manner as the South Fork Snake River (Elle et al. 1987).

Trout population estimates were generated for Squirrel Creek and Conant Creek, tributaries to Falls River. Trout were marked in one section of Conant Creek with either a caudal fin clip or numbered Ploy tags. Fish receiving marks were captured with conventional angling gear. One week later, the section receiving marked fish was snorkeled by one observer, enumerating all observed marked and unmarked trout. Trout abundance was estimated by the Chapman-modified Peterson equation. Squirrel Creek was snorkeled to obtain an actual total estimate. Trout spawning and rearing habitat was visually assessed. Indicators of habitat quality, stream substrate sedimentation, condition of riparian vegetation, undercut stream banks, frequency of pools and in-stream cover were noted and recorded.

Hatchery Trout Evaluation

Reward jaw tags were placed on 400 of the 7,745 catchable rainbow trout stocked in Falls River to evaluate exploitation of those fish. Four releases of equal numbers of catchables were made (June 14, June 30, July 12, and July 26). One hundred fish in each group received reward tags.

Henrys Fork Snake River

We completed a fish population estimate in Box Canyon from Buffalo River to the Last Chance summer homes during May 1989 (Figure 1). We used a Peterson mark-recapture estimate. We used two drift boats, as described earlier, for marking fish on May 16 and 17. We completed a recapture run on May 24. The population estimate was used for comparison with 1987 information.

On May 18, 1989 we conducted a one-pass collection of trout from lower Mesa Falls to Warm River as described earlier (Figure 1). Access to the river at lower Mesa Falls is a 500-ft boat slide. This restricted access limited us to one trip through the river section. We obtained a relative abundance sample versus a full population estimate. Data was compiled for a comparison of the size of fish present in this less-exploited section to the section from Ashton Reservoir to Warm River.

South Fork Snake River

Trout populations in the South Fork Snake River were monitored using electrofishing and aerial redd (brown trout) surveys. Using a jet boat with boom-mounted anodes, electrofishing estimates were completed on a 5.1 km section above Palisades Creek, a 4.9 km section at Conant Valley, a 2.9 km section above Twin Bridges, and a 4.8 km section at Lorenzo (Figure 2 and Table 1). All population estimates were made using the Peterson method (Lackey and Hubert 1977), with two days spent marking fish and one day completing the recapture run. Estimates were made for size groups based on sampling efficiency. We allowed a one-week interval between marking and recapture runs. We sampled Palisades and Twin Bridges sections in September and Conant and Lorenzo sections in October.

We salvaged the Palisades Dam stilling basin for the Bureau of Reclamation on October 17, 1989. Records were kept only of the numbers by species for fish captured. All fish were released into the river at the dam.

Table 1. Physical characteristics and fishing regulations for South Fork Snake River electrofishing sections. (Measurements derived from fall 1988 aerial photographs.)

Location	Length (km)		Surface area (hectares)			Regulation
	Main Channel	Side Channels	Main Channel	Side Channels	Total	
Lorenzo	4.8	0.8	20.7	1.4	22.15	General ¹
Twin Bridges	2.9	4.2	10.5	8.5	19.11	General
Conant Valley	4.9	2.3	29.6	5.4	35.03	Restricted ²
Palisades	5.1	--	40.4	--	40.43	Restricted ³

¹General limit equals 6 trout, only 2 over 16-in.

²Restricted limit equals 6 trout, no more than 2 cutthroat trout, all cutthroat trout 10-in to 16-in must be released. Regulation began in 1984.

³Restricted limit as above. Regulation began in 1988.

The annual brown trout spawning survey was conducted on December 18, using fixed-wing aircraft. Counts were made flying downstream from Palisades Dam to the confluence of the Henrys Fork, as in previous years (Elle et al. 1987).

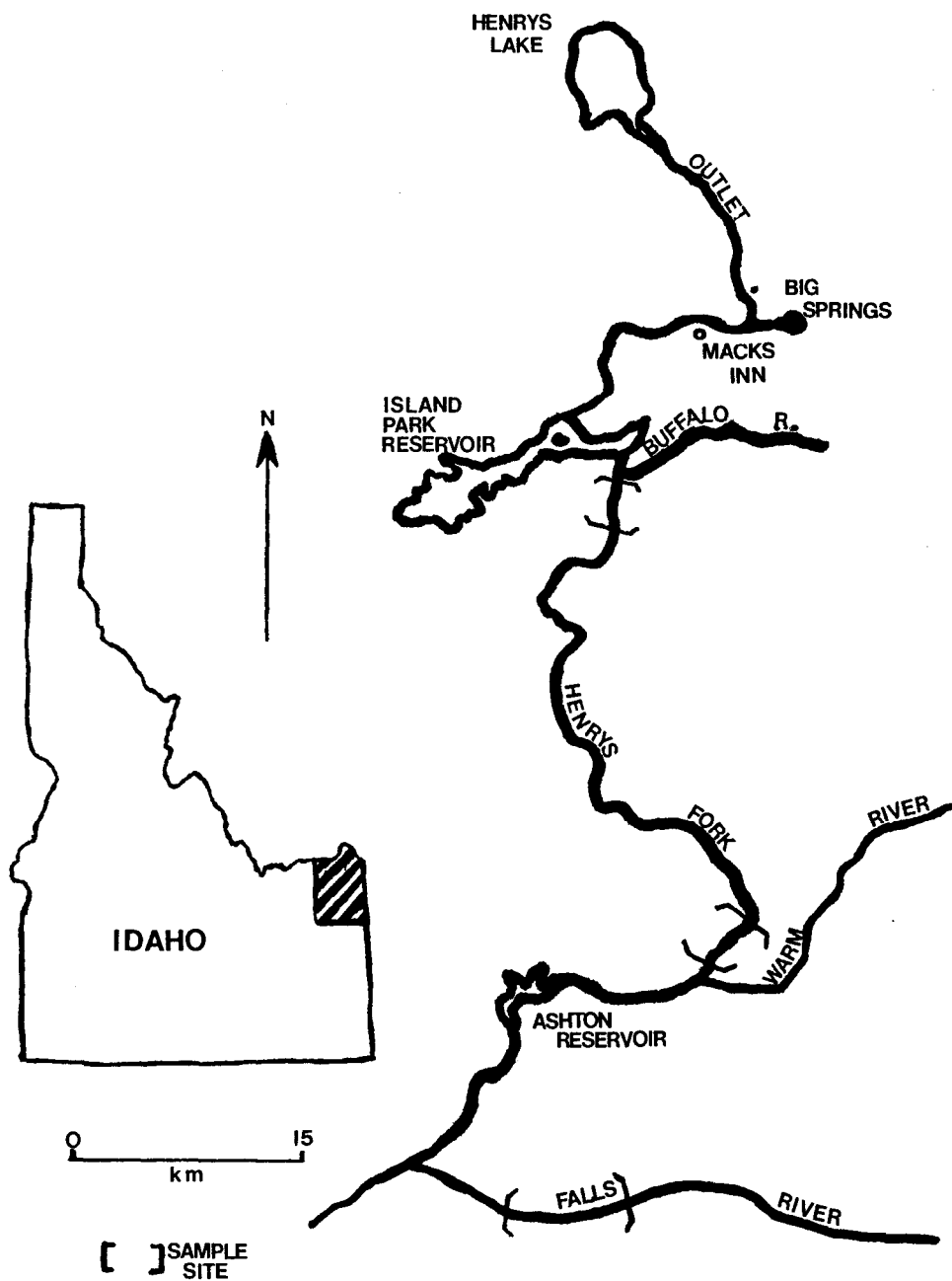


Figure 1. Map showing 1989 population electrofishing transects for Henrys Fork Snake River and Falls River.

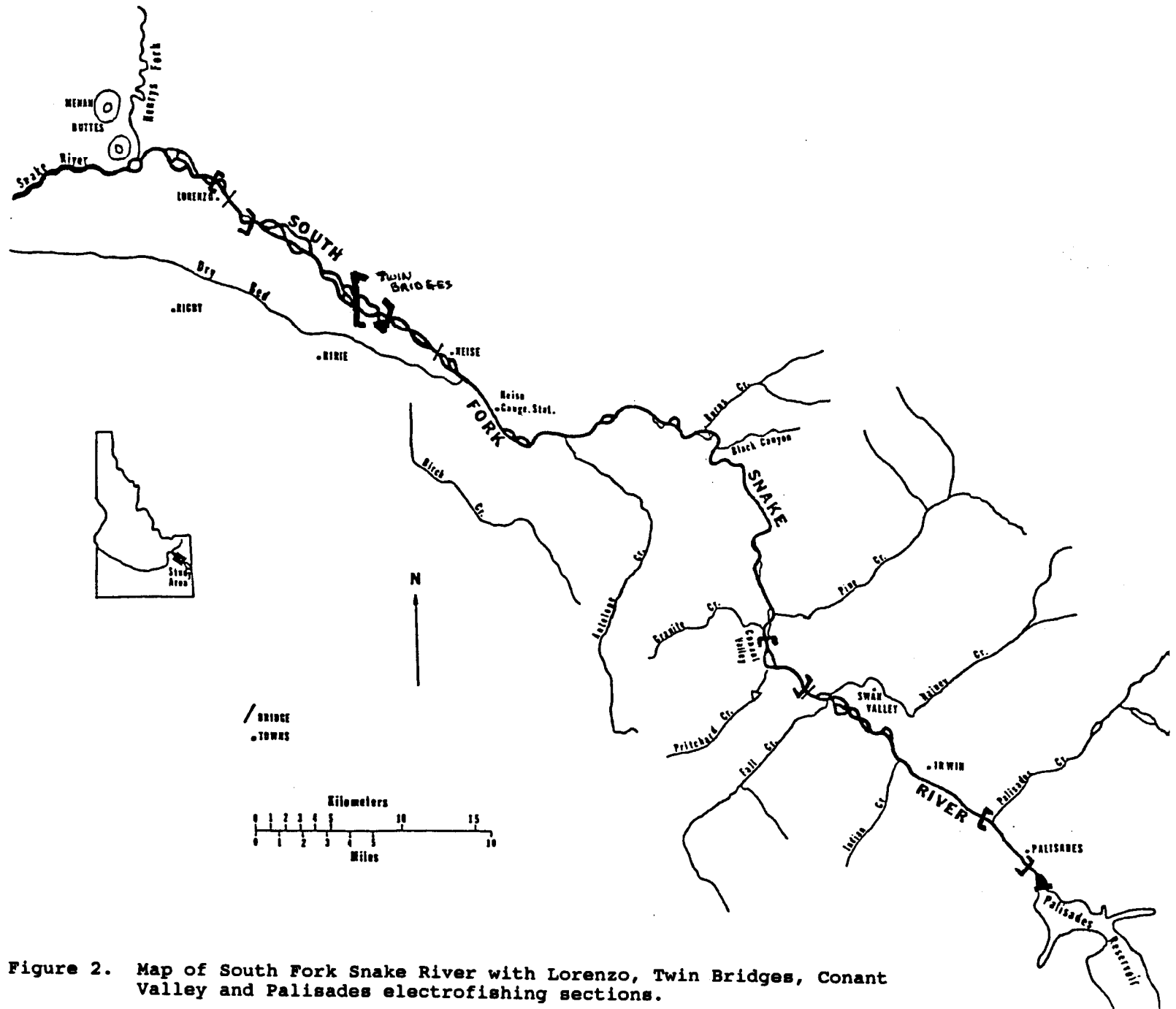


Figure 2. Map of South Fork Snake River with Lorenzo, Twin Bridges, Conant Valley and Palisades electrofishing sections.

Willow Creek

Trout abundance estimates were calculated for Willow Creek tributaries using a backpack shocker and the two-pass depletion method described by Platte et al. (1983). Habitat observations were recorded as described above.

Snake River

We released 50 reward-tagged rainbow trout during each stocking of hatchery catchables in the Gem State Reservoir and in the Idaho Falls reach of the Snake River. A total of 700 tagged rainbow trout were released, 350 at each location. Releases were made monthly from March through September with two releases in April. A baseball cap was offered as a reward to all anglers returning tags. Signs posted along the river corridor informed anglers how to report tagged fish information and collect their reward. Returns were analyzed for percentage of return-to-the-creel, movement and time between stocking, and harvest.

RESULTS

Falls River Drainage

Falls River

Personnel were able to complete only one population estimate between the Marysville and Enterprise canal diversions (approximately 15 km) in June 1989. Whitefish (123/hectare) and trout (116/hectare) were present in comparable numbers. Trout greater than 250 mm were approximately 50% as abundant between 160 mm and 250 mm (Table 2).

Low water prevented completion of estimates on sample sections from Sheep Falls to the Yellowstone Canal diversion, from the Yellowstone Canal diversion to the Marysville Canal diversion, and from the Marysville Canal diversion to Kirkham Bridge. However, length frequency distributions of trout above and below Kirkham Bridge (Figures 3, 4, and 5) illustrate a division in distribution of larger trout with fewer rainbow trout greater than 300 mm in sections sampled upstream of Kirkham Bridge.

Table 2. Population estimates and densities by size group of wild rainbow trout and mountain whitefish in the Falls River from Kirkham Bridge to the Enterprise Canal Diversion in 1989.

<u>Species</u>	<u>Size Group</u>	<u>Estimate</u>	<u>95% confidence intervals</u>	<u>No./hectare</u>
Rainbow trout	160-249 mm	5,031	2,498-11,005	77
	≥ 250 mm	2,617	1,260- 5,106	37
	≥ 160 mm	7,167	4,577-13,498	116
Whitefish	all sizes	8,037	5,788-12,055	123

Falls River

Kirkham - Enterprise

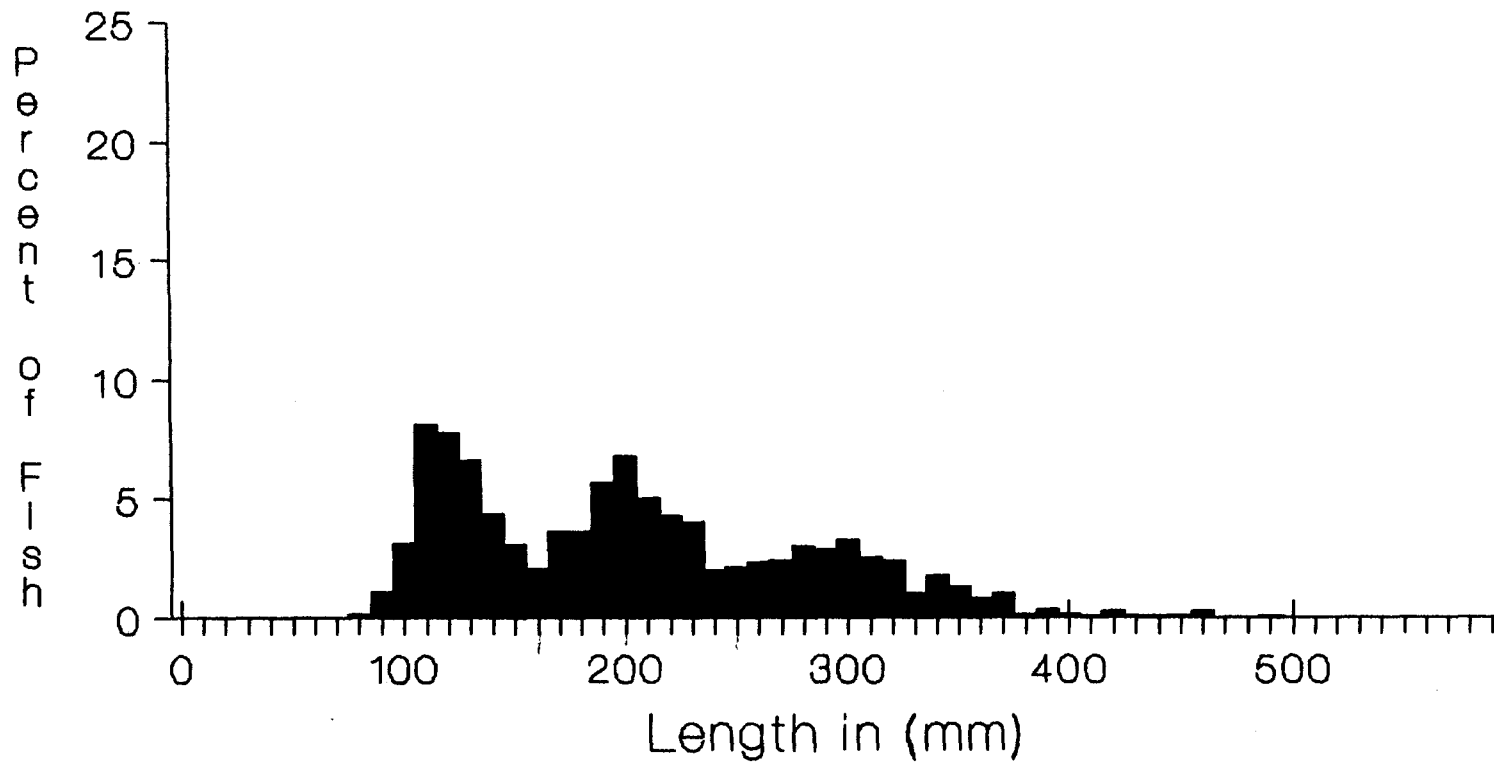


Figure 3. Length frequency for wild rainbow trout collected in Falls River from Kirkham Bridge to Enterprise Canal, June 1989. (n = 1,075)

Falls River Yellowstone - Marysville

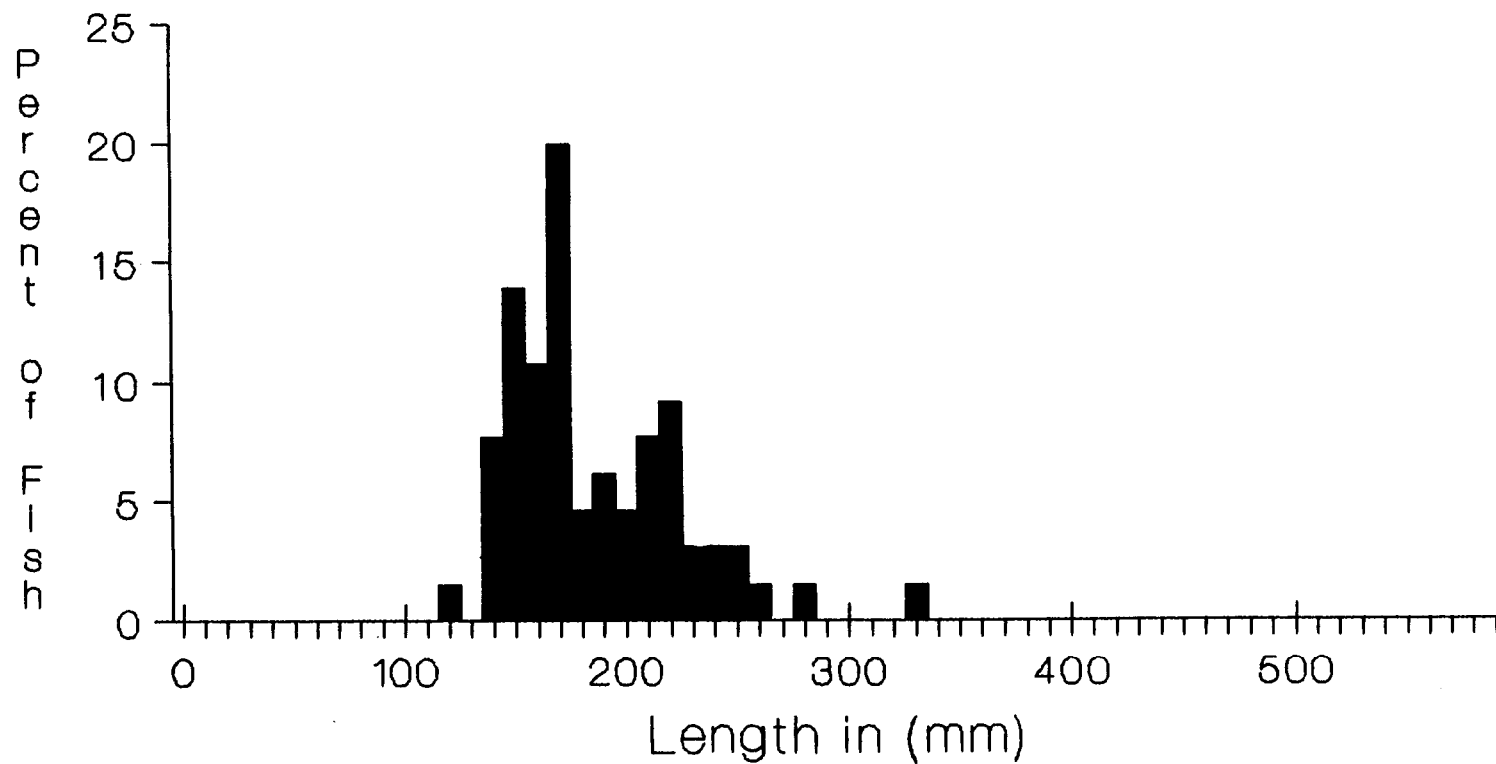


Figure 4. Length frequency for wild rainbow trout collected in Falls River from Yellowstone Canal to Marysville Canal diversions, August 1989.
(n = 75)

Falls River

Below Lower Marysville Canal

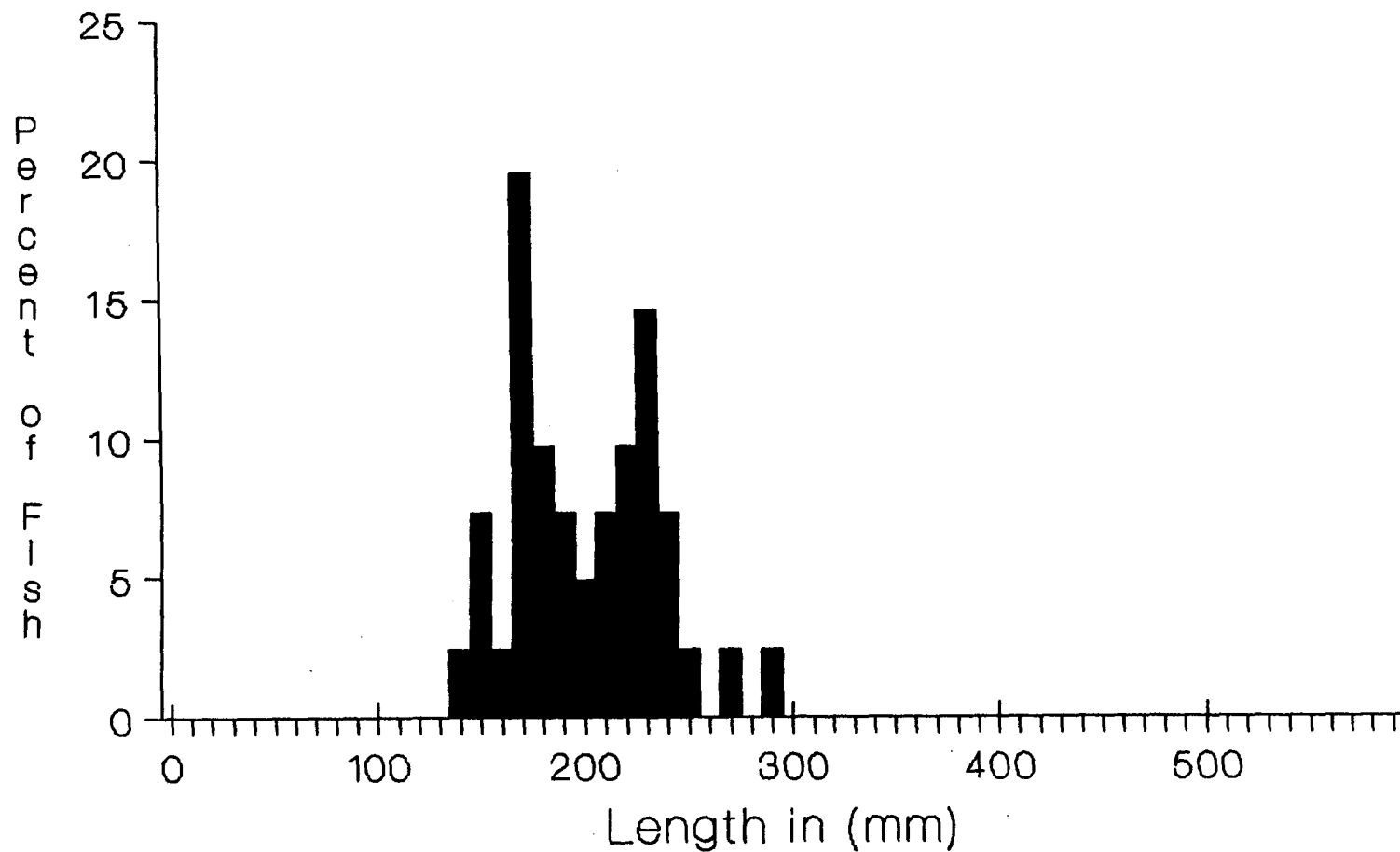


Figure 5. Length frequency for wild rainbow trout collected in Falls River from Marysville Canal downstream to Squirrel Bridge, August 1989.
(n = 41)

Squirrel Creek

A population estimate was not obtained from Squirrel Creek; however, adult brook trout, wild rainbow trout, and cutthroat trout fry were observed. Whitefish were not observed, but longnose dace Rhinichthys cataractae, speckled dace Rhinichthys osculus, redbreasted sunfish Richardsonius balteatus and sucker fry Catostomus sp. were. Habitat in the snorkeled reach is excellent, with dense riparian vegetation, overhanging cover, and root wads. Spawning gravel and deep pools are abundant. Habitat below the Forest boundary is in poor condition due to overgrazing and irrigation withdrawals. Three irrigation barriers were identified at county road culverts below the snorkeled stream reach.

Conant Creek

Brook trout, wild rainbow trout, and mountain whitefish were observed in Conant Creek. Separate estimates of brook trout and rainbow trout were not possible. An estimated 137 trout were present in 483 m of surveyed stream. Densities of trout were 8 trout/100 m² and 28 trout/100 m.

Mountain whitefish were numerous. Few nongame fish were observed. Habitat quality was in good condition on the Forest, but grazing practices, leafy spurge treatment, and irrigation withdrawals have heavily impacted habitat on private property downstream of the Forest boundary.

Hatchery Trout Evaluation

Forty of the 400 reward tags placed on Falls River hatchery catchable rainbow trout were turned in by anglers (10% return overall). Among the four releases, return rates varied from 5% to 17% (Table 3). All tags returned were taken from Falls River between July and November 1989.

Island Park Reservoir Tributaries

Trout abundance and density estimates for the surveyed reservoir tributaries are summarized in Table 4. Brook trout are by far the most abundant salmonid in those tributaries. Wild rainbow trout were the next most abundant trout. Cutthroat trout were found only in Hotel Creek. Mountain whitefish were not found in the sampled stream sections.

Table 3. Reward tag returns (percentages) from hatchery catchable rainbow trout released in Fall River between the Fremont County Bridge and the Reclamation Road Bridge in 1989.

Date Released	Percentage of Tags
Returned	
June 14	11
June 30	17
July 12	5
July 26	7

Table 4. Population estimates and densities of over-yearling trout in Island Park Reservoir tributaries in 1989.

Stream	Species ^a and (%)	Estimated number (trout/100 m ²)
Hotel Creek	Brook (88%)	Combined estimate
	Rainbow (6%)	Combined estimate
	Hybrid (4%)	Combined estimate
	Cutthroat (2%)	Combined estimate
	Total	170.0 (32.7)
Icehouse Creek	Brook (100%)	No estimate
Sheep Creek	Rainbow (91%)	Combined estimate
	Brook (6%)	Combined estimate
	Cutthroat (2%)	Combined estimate
	Total	38.1 (10.0)
Harrison Springs Creek	Brook (89%)	Combined estimate
	Rainbow (11%)	Combined estimate
	Total	177.8 (177.8)
Sheridan Creek		No trout captured

^aPercentages of total numbers of captured trout by species shown in parentheses. Population estimates by species were not possible. Rainbow trout and cutthroat trout were wild.

Habitat quality varies among the surveyed tributaries, depending on the level of livestock grazing occurring on each stream. Sheridan Creek, with the poorest quality spawning and rearing habitat, had no trout in the sampled reach immediately above the Yale/Kilgore road crossing (state land). Among the surveyed streams, Icehouse Creek had the best spawning and rearing potential. Stream banks are in excellent condition, undercut, with good quality pools. Quality spawning substrate is abundant.

Henrys Fork

Population Sampling

Box Canyon (Buffalo River to Last Chance) - Wild rainbow trout comprised 92% of the age 1 and older trout captured in the Box *Canyon* of the Henrys Fork in 1989. Brook trout (6%), hatchery rainbow trout (2%), and rainbow trout x cutthroat trout hybrid were also captured. No cutthroat trout juveniles were captured, despite the presence of adult cutthroat trout captured in 1987 (Angradi and Contour 1989) and 1989.

The estimate for all wild rainbow trout greater than 100 mm was 5,442 or 177/hectare in 1989 (Table 5). The estimate represents a major decline from the estimate of 13,434 (554/hectare) rainbow trout greater than 175 mm for 1987. The most notable declines occurred in the age 1 and age 2 classes (Figures 6 and 7). Compared to 1987, similar numbers of larger rainbow trout were present in 1989 with a higher percentage of fish over 450 mm (Table 6). Catch-and-release regulations were enacted in 1988. Prior to 1988, harvest of rainbow trout greater than 507 mm (20-in) was allowed.

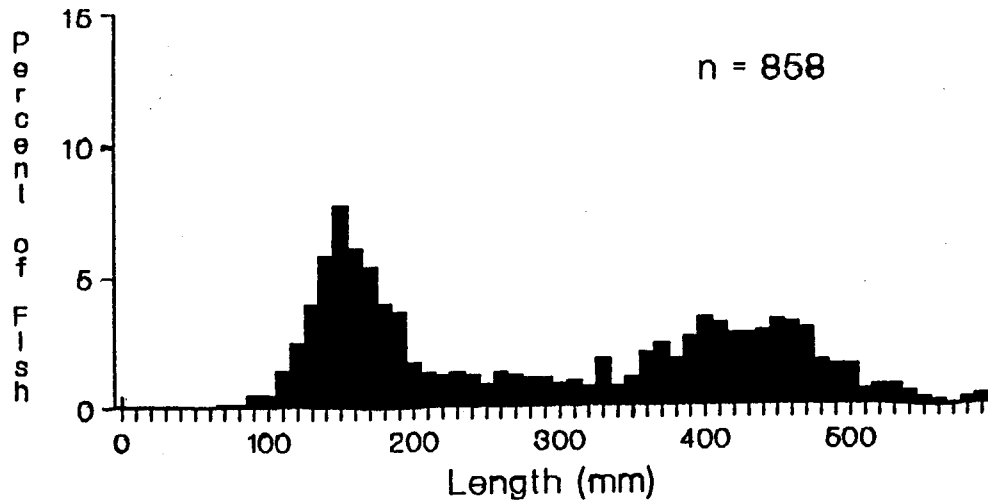


Figure 6. Length frequency percent of wild rainbow trout captured by electrofishing in Box Canyon, May 1989.

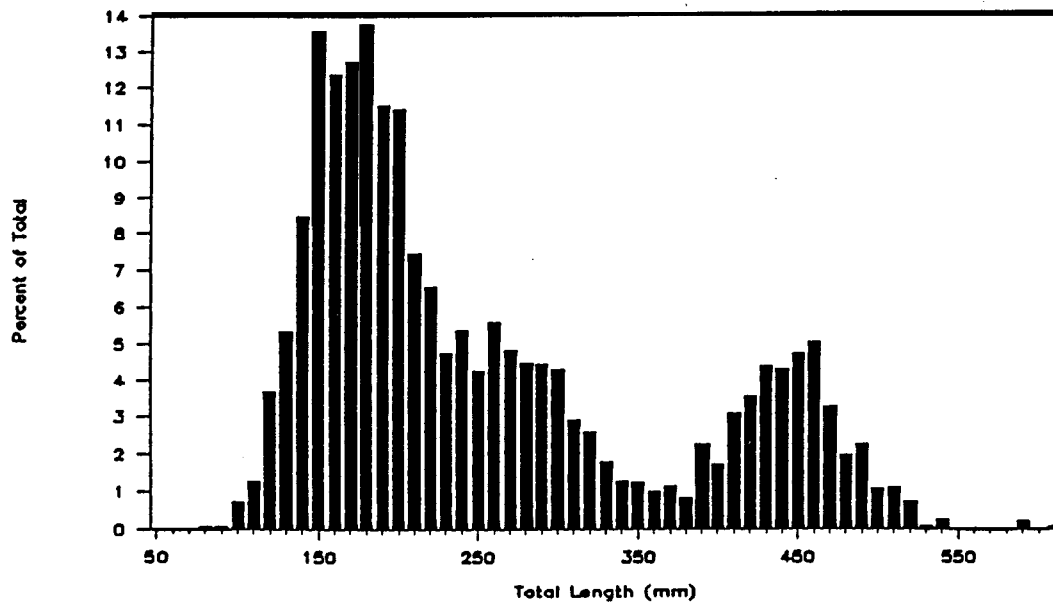


Figure 7. Length frequency percent of wild rainbow trout captured in 1987 by electrofishing in Box Canyon (n = 1,943, mean length = 250 mm). Data from Angradi and Contour 1987.

Table 5. Fish population estimates (with 95% confidence intervals) for the Box Canyon section of the Henrys Fork.

Year	Species	Size group (mm)	Estimate	(95% C.I.)	No./Hectare
1989	Wild rainbow	100-219	3,987		164
		220-349	567		23
		≥350	1,373	(925- 2,258)	57
		All	5,442	(3,975- 7,926)	224
	Whitefish	175-240	890	(501- 1,785)	37
		240-349	3,248	(1,434- 7,846)	134
		≥350	3,641	(2,747- 5,047)	150
		All ≥150	7,118	(5,490- 9,302)	293
1987 ^a	Wild rainbow	175-250	10,276	(5,338-21,634)	423
		250-400	4,607	(2,393- 9,698)	190
		>400	1,727	(1,102- 2,853)	71
		All >175	13,434	(9,553-19,541)	553

^a(Angradi and Contour 1989)

Table 6. Percentage of rainbow trout by size group sampled from the Box. Canyon section of the Henrys Fork.

Year	Total catch	<150	150-249	250-349	350-450	>450
1987	1,945	17	45	17	13	8
1989	860	15	33	10	24	18

Mesa Falls to Warm River - Compared to data from Warm River to Ashton Reservoir (Elle and Corsi in press), the Henrys Fork below Mesa Falls contains a greater portion of rainbow trout over 300 mm (Figures 8 and 9 and Table 7). The mean size for wild rainbow trout was 276 mm below Mesa Falls, versus 251 mm below Warm River. Rainbow trout represented the highest species composition in both sections (Table 8). Brown trout were captured below Mesa Falls.

Although spawning habitat appears limited from Mesa Falls to Warm River, we did observe juvenile rainbow trout and brown trout in the section. Spawning gravels appear to be localized near out-wash ravines like Bear Gulch and Anderson Mill Canyon.

Table 7. Comparison of wild rainbow trout captured in the Henrys Fork from below Mesa Falls and from Warm River to Ashton Reservoir.

Location	Year	Number Sampled	Mean length (mm) For fish >180 mm	% trout by size (mm)		
				200-299	300-399	>400
Mesa Falls to Warm River	1989	361 ^a	276	68	25	6
Warm River to Ashton Reservoir	1988	1,147 ^b	251	80	18	2

^aOne day sampling with two drift boats.

^bThree days sampling with two drift boats.

HENRYS FK. ABOVE ASHTON WILD RAINBOW TROUT

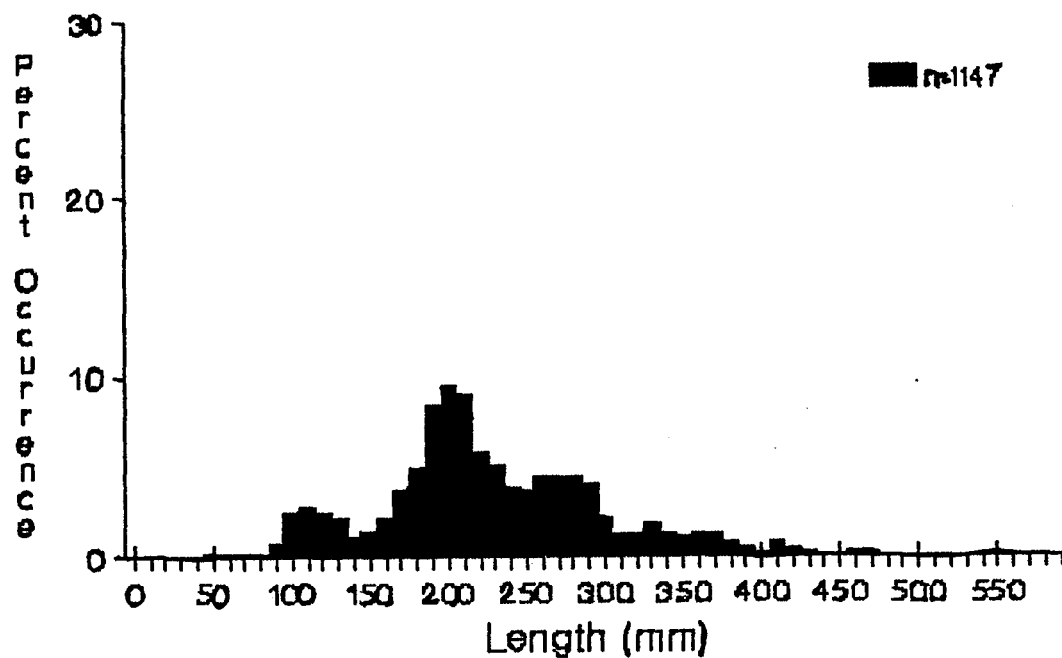


Figure 8. Length frequency for rainbow trout captured in the Henrys Fork from Warm River to Ashton Reservoir, September 1988.

Mesa Falls to Stone Bridge Rainbow Trout

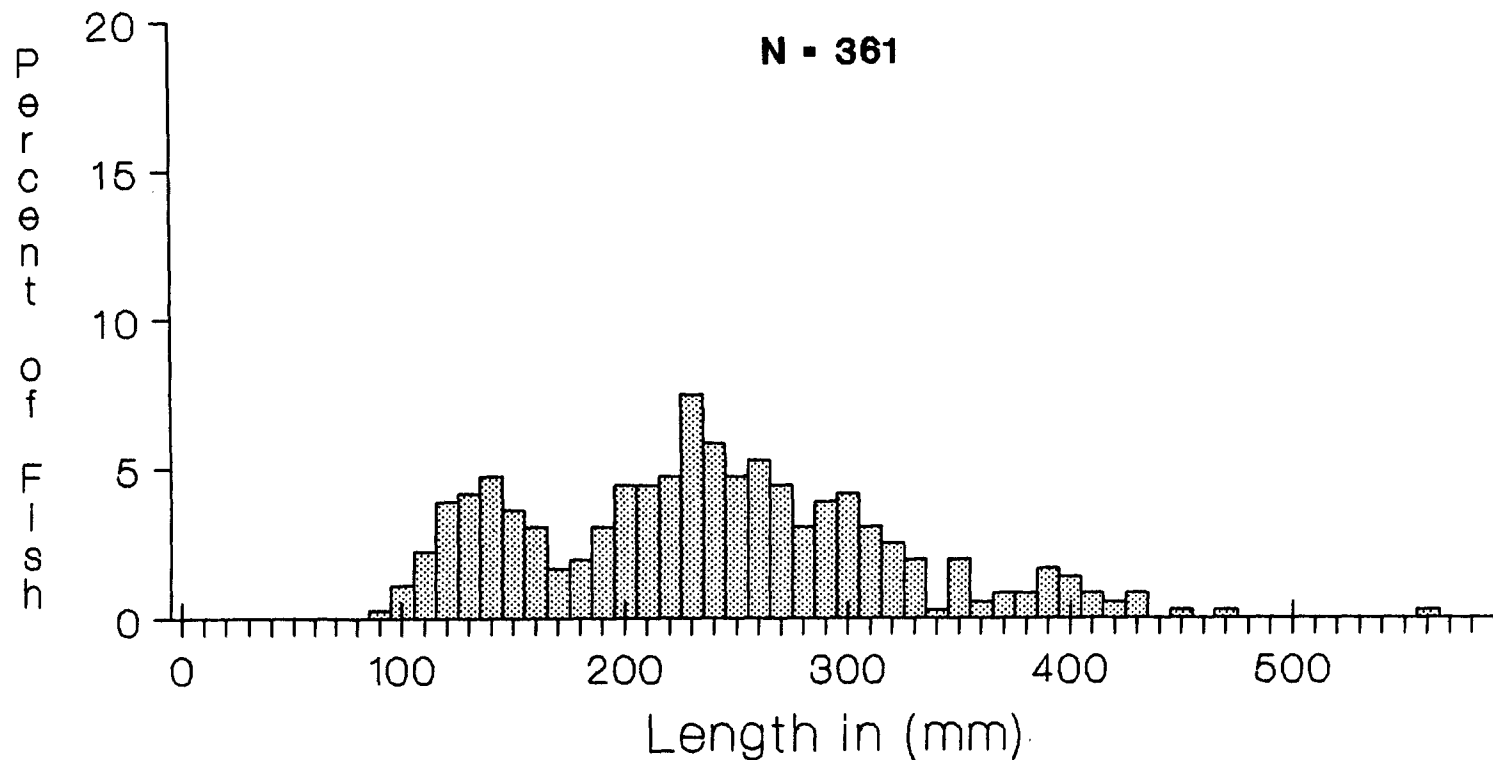


Figure 9. Length frequency distribution in the Henrys Fork for rainbow trout captured from Lower Mesa Falls to Warm River, May 1988.

Table 8. Species composition for trout captured in two sections of the Henrys Fork, Mesa Falls to Warm River and Warm River to Ashton Reservoir.

Location	Year	Wild			Wild
		Rainbow	Brown	Brook	Cutthroat
Mesa Falls to Warm River	1989	88	12	<1	
Warm River to Ashton Reservoir	1988	95	4	--	1

South Fork Snake River

Population Sampling

Palisades - A total of 962 trout were captured at least once during three days of electrofishing in the Palisades section. Species composition included wild cutthroat trout (81%), brown trout (8%), rainbow trout and hybrid trout (9%), and hatchery cutthroat trout (2%) (Table 9). Hatchery cutthroat trout originate in Palisades Reservoir and move through the dam facilities.

Compared with 1987, cutthroat trout densities (Table 10) and mean size increased dramatically during 1989. The mean size in 1989 equaled 357 mm with 23% of the cutthroat trout larger than 405 mm. This river section has no side channels, and winter flow reductions should not result in stranding of juvenile trout. Few age 0 and age 1+ cutthroat trout were sampled in 1989 (Figure 10), which probably is due to lack of spawning habitat. Most cutthroat trout were older fish (Table 11). The implementation of the cutthroat trout harvest regulations in 1988 appears to have resulted in increased numbers of many age 3 and older cutthroat trout.

Brown trout were difficult to catch in the Palisades section during fall. We were only able to make an estimate for brown trout 180 mm to 299 mm. The brown trout density was much lower compared to 1987 (Table 10) when the estimate was made in March. Seasonal shifts in trout distribution plus higher flows may have influenced both the cutthroat trout and brown trout density changes observed in 1989.

Conant Valley - A total of 2,531 trout were captured at least once at Conant Valley in 1989. Cutthroat trout represented 90% of the trout sampled, compared to 88% in 1988 (Table 9) (Elle and Corsi in press). In 1989, brown trout comprised 7% of the fish sampled and rainbow trout and hybrids made up 3%. Overall, species composition changed little from 1988.

Table 9. Species composition in electrofishing catch for trout captured from four sections of the Snake River in 1989.

Location	Date	Number Sampled	Species Composition (%)			
			Wild	Rainbow/Cutthroat	Hatchery	Cutthroat
Lorenzo	10/89	551	34.3	65.7		
Twin Bridges	9/89	730	50.3	49.5	0.3	
Conant Valley	10/89	2,531	89.9	6.9	3.3	
Palisades	9/89	962	80.9	8.1	9.3	1.8

SFSR PALISADES 1989 CUTTHROAT TROUT

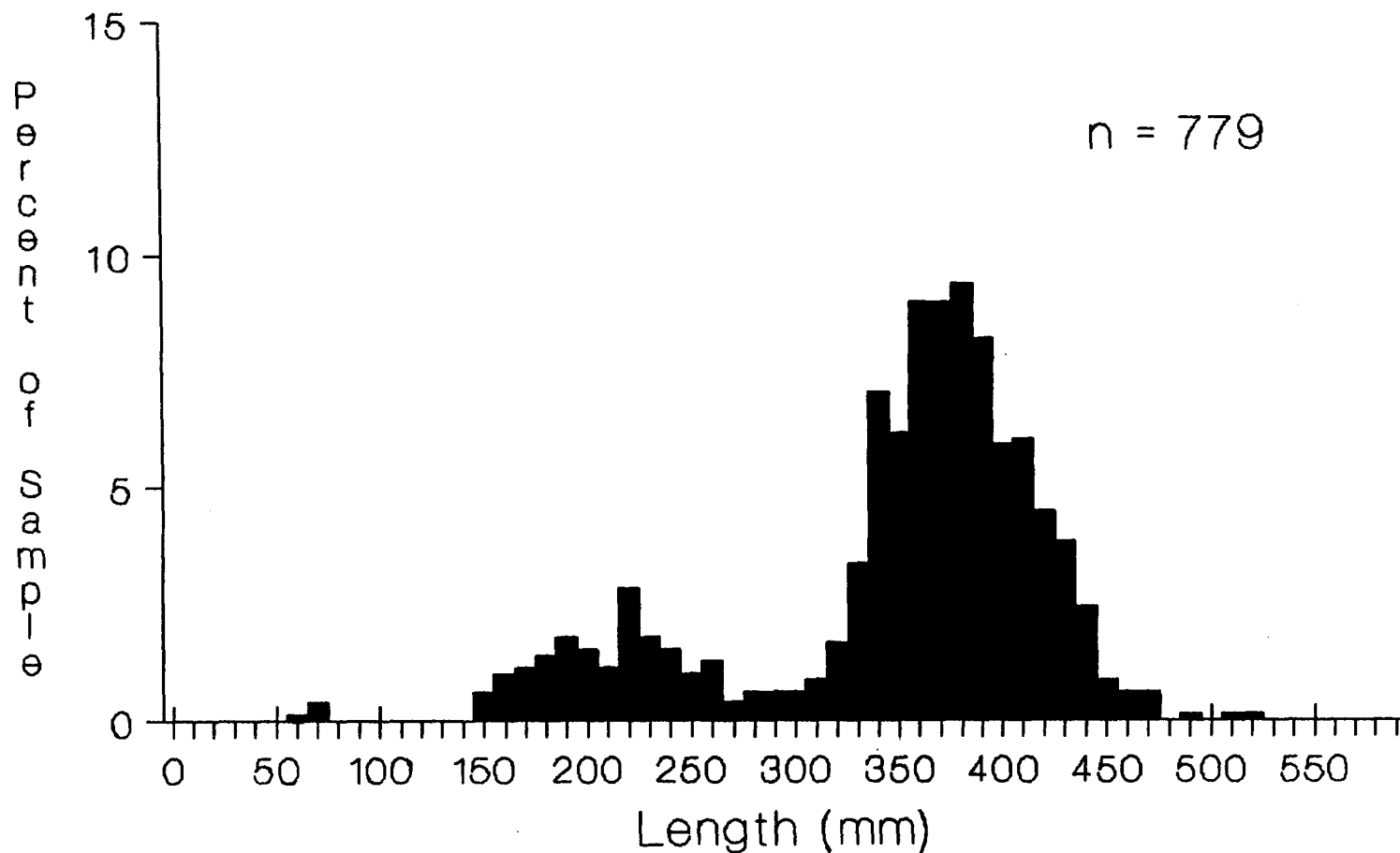


Figure 10. Length frequency for wild cutthroat trout sampled in the Palisades section of the South Fork Snake River during September 1989.

Table 10. Comparison of cutthroat trout densities (fish \geq 250 mm/hectare) from different sections of the South Fork Snake River, 1986 through 1989.

Location	Date	Cutthroat Trout per hectare	Brown Trout per hectare
Lorenzo	10/87	52.0	71.0
	10/88	30.0	64.0
	10/89	19.3	38.5
Twin Bridges	9/89	58.5	48.1
Conant Valley	11/86	167.2	21.9
	10/88	165.9	28.5 ^a
	10/89	186.8	17.8
Palisades	3/87	17.3	14.3
	9/89	43.7	4.0

^aEstimate of 991 brown trout based upon only four recaptures and represents a low precision estimate.

Table 11. Population estimates for wild cutthroat trout, brown trout, and rainbow trout x cutthroat trout hybrid from the Snake River in 1989. (Palisades and Twin Bridges sections sampled during September; Conant and Lorenzo sections sampled during October.)

Location	Species	Size Group (mm)	Estimate	(95% C.I.)	Number Per km	Number per Hectare
Lorenzo	Cutthroat	150-249		No estimate		
	Cutthroat	250-329		No estimate		
	Cutthroat	>329	304	(188-577)	63	13.70
	Brown	180-329	537	(317-1,359)	120	25.90
	Brown	>329	239	(154-421)	50	10.80
Twin Bridges	Cutthroat	180-329		>597 ^a	206	31.20
	Cutthroat	>329	796	(557-1,234)	274	41.60
	Brown	200-379	474	(289-928)	163	24.80
	Brown	>379	452	(315-709)	156	23.60
Conant Valley	Cutthroat	100-249	1,148	(557-3,735)	234	32.80
	Cutthroat	250-329	572	(365-1,030)	117	16.30
	Cutthroat	>329	5,940	(5,166-6,906)	1,212	169.60
	Brown	180-299	101	(56-238)	21	2.90
	Brown	300-399	132	(64-429)	27	3.80
	Brown	>399		No estimate		
	Hybrid	170-299	70	(34-228)	14	2.00
	Hybrid	>299	118	(61-337)	24	3.40
Palisades	Cutthroat	150-249		No estimate		
	Cutthroat	250-329	171	(83-558)	33	4.20
	Cutthroat	>329	1,574	(1,241-2,065)	1,574	38.90
	Brown	180-299	88	(53-179)	17	2.20
	Brown	300-399		No estimate		
	Brown	>399		No estimate		
	Hybrid	170-299		No estimate		
	Hybrid	>299	73	(40-173)	14	1.81

^aMinimum estimate without confidence limits, due to only three recaptures.

Densities of cutthroat trout (larger than 250 mm) increased somewhat from 1986 and 1988 (Table 10). A density increase of 43% occurred in the age 3 and older fish (> 330 mm), while a 65% decline was observed in densities of cutthroat trout 250 mm to 329 mm (age 2+) (Table 11). This decline in age 2+ fish continues to indicate the extent of the low winter flow cumulative impacts to juvenile fish in the winters of 1987-88 and 1988-89.

Mean length of age 1+ and older cutthroat trout (> 140 mm) equaled 358 mm in the Conant section, compared to 344 mm in 1988 and 334 mm in 1986. This increase in mean size reflects the increased proportion of age 3+ cutthroat trout and decrease in age 2+ fish (Figure 11). The percentage of cutthroat trout greater than 405 mm (16-in) was 10% in 1989, compared to 9.1% and 5.9% in 1987 and 1988, respectively. Relatively few cutthroat trout exceeded 430 mm, indicative of high harvest pressure once fish reach the upper end of the protective size limit (405 mm). The block of cutthroat trout consistently missing during 1988 through 1989 are the 250 mm to 330 mm age 2+ juveniles (Figure 12).

We were able to make estimates for brown trout from 180 mm to 399 mm (Table 11.) As in 1988, no estimate was possible on brown trout over 400 mm. The October estimate does not accurately survey larger brown trout. Although sampling dates have changed, the densities for brown trout in the Conant section have varied around 20/hectare (Table 10).

Twin Bridges - At Twin Bridges, we captured 730 trout and 1,017 whitefish at least once. Species composition was equally split between cutthroat trout and brown trout. Rainbow trout and hybrid trout were virtually nonexistent, which follows the trend of declining abundance the farther downstream from Palisades Dam we sampled (Table 9).

We sampled the Twin Bridges section for the first time in 1989. We were unable to complete population estimates on small cutthroat trout due to a lack of recaptures (Table 11). For cutthroat trout larger than 330 mm, our estimate equaled 796 or 41.6/hectare. Densities of cutthroat trout in this section were much lower than Conant Valley, but higher than the Palisades or Lorenzo sections (Table 10).

Densities of brown trout were highest in the Twin Bridges section (Table 10). Brown trout of all sizes were captured, including age 0+ fish, indicating brown trout spawning habitat within the section. No age 0+ cutthroat trout were captured in this section. Cutthroat trout recruitment may be from downstream drift.

Mean size for age 1+ and older cutthroat trout (> 180 mm) equaled 350 mm, with 18% greater than 405 mm (16-in) (Figure 13). This section has extensive braided channels with excellent woody habitat for all sizes of trout. The higher percentage of large cutthroat trout is indicative of low angler effort. Public access is limited in this river reach.

We estimate a whitefish population of 15,517 (9,612-29,435 95% C.I.) in this section. The density equaled 5,350 whitefish/km, which is intermediate between estimates for Conant Valley (8,575/km) and Lorenzo (1,886/km).

Lorenzo - We captured 551 cutthroat trout and brown trout in the Lorenzo section in 1989. Cutthroat trout represented only 34% of the fish captured, lowest of any river section (Table 9). Species composition has changed little from 1988. No rainbow trout or hybrid trout were captured. Age 0+ cutthroat trout and age 1 brown trout were captured, indicating natural production. However, a general lack of juvenile cutthroat trout prevented estimates for all sizes except cutthroat trout larger than 330 mm. Similar to the Conant Valley, the Lorenzo section shows a decline of 250 mm to 330 mm cutthroat trout during 1988 and 1989 (Figures 14 and 15).

SFSR CONANT 1989 CUTTHROAT TROUT

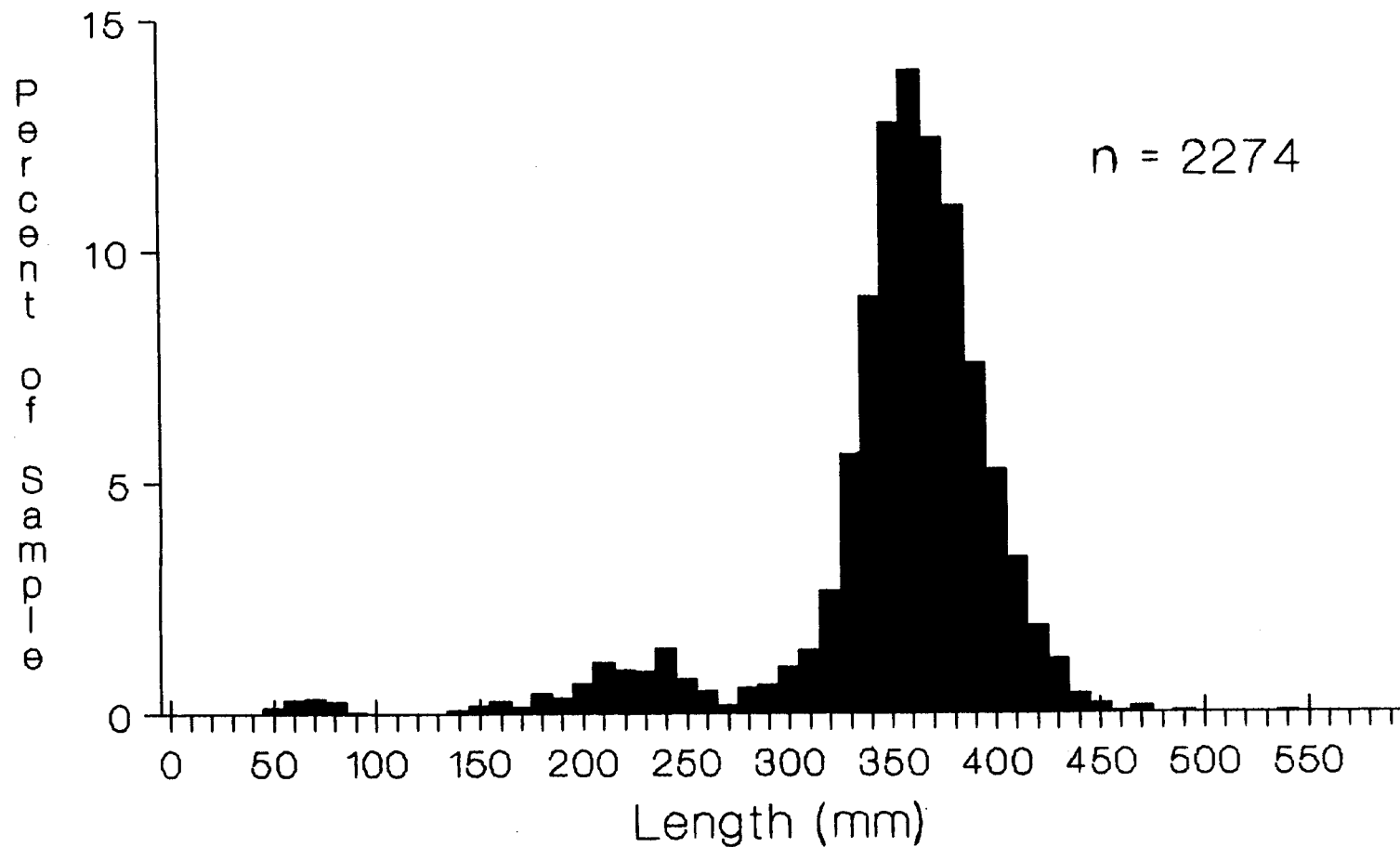


Figure 11. Length frequency of wild cutthroat trout sampled in the Conant section of the South Fork Snake River during October 1989.

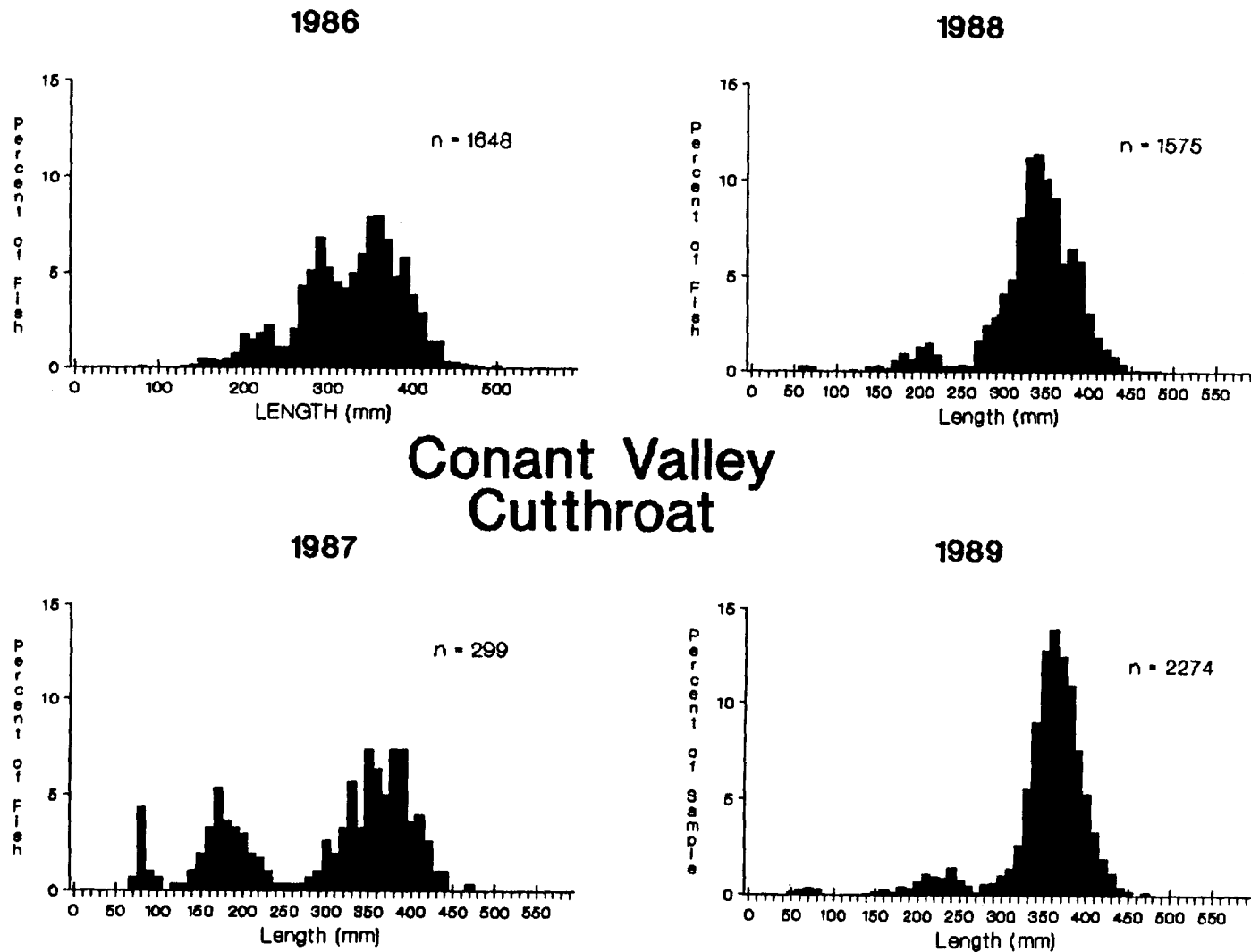


Figure 12. Comparison of length frequencies for wild cutthroat trout sampled at the Conant section of the South Fork Snake River from 1986 through 1989.

SFSR TWIN BRIDGES 1989

CUTTHROAT TROUT

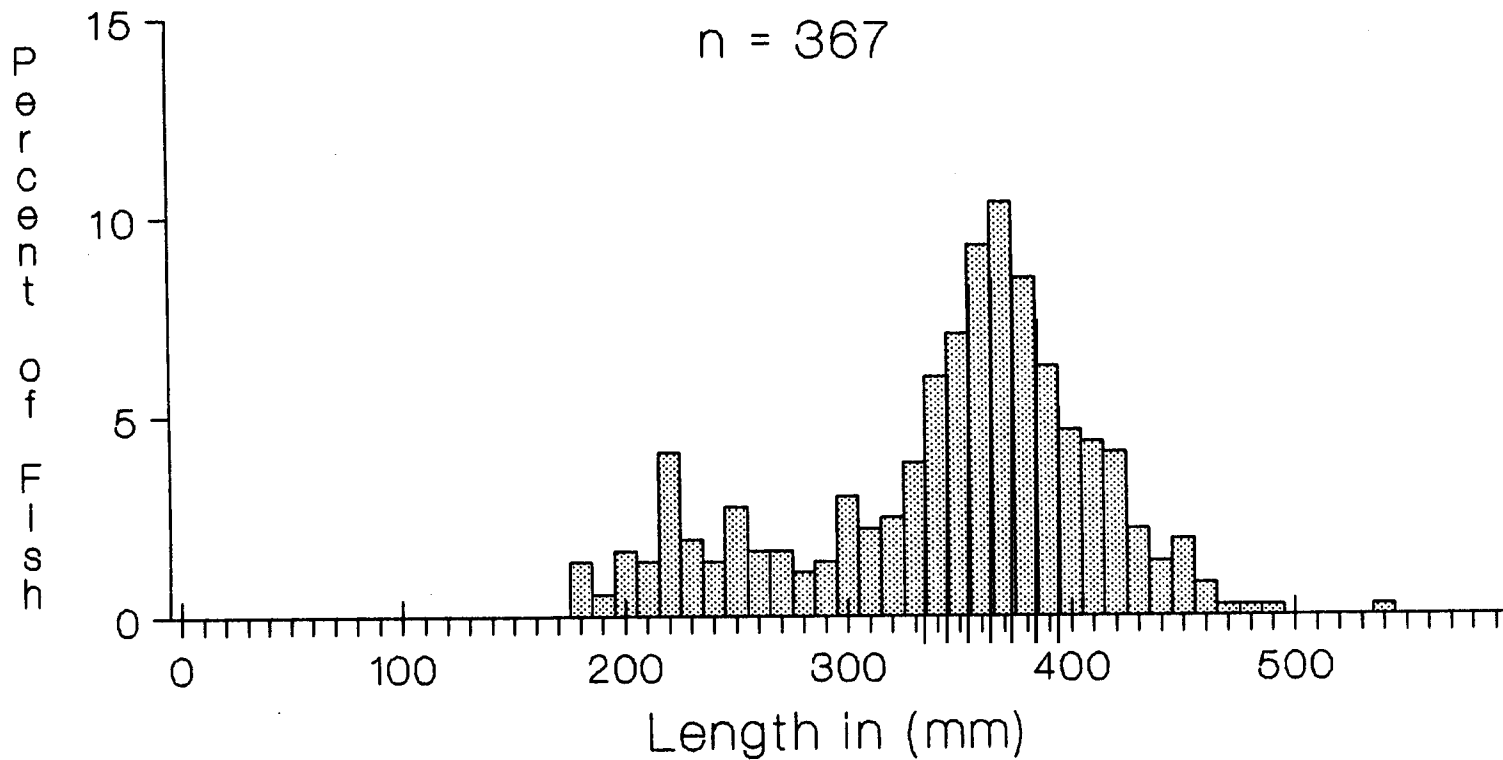


Figure 13. Length frequency of wild cutthroat trout sampled in the Twin Bridges section of the South Fork Snake River during September 1989.

SFSR LORENZO 1989 CUTTHROAT TROUT

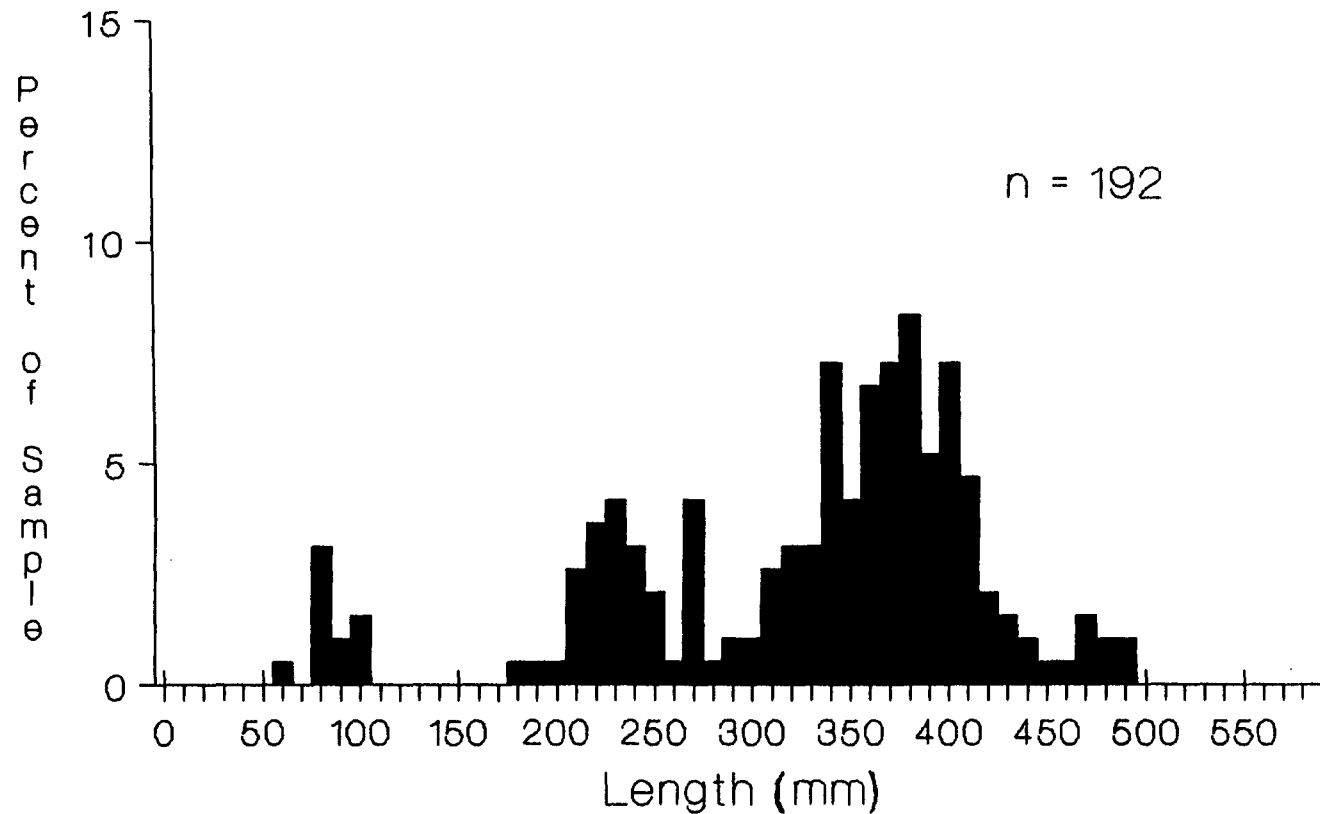
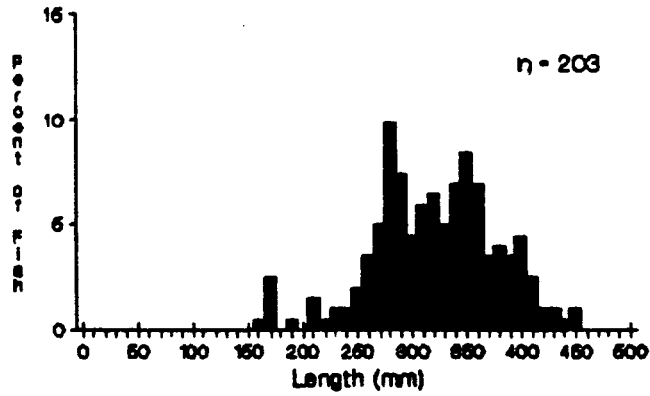
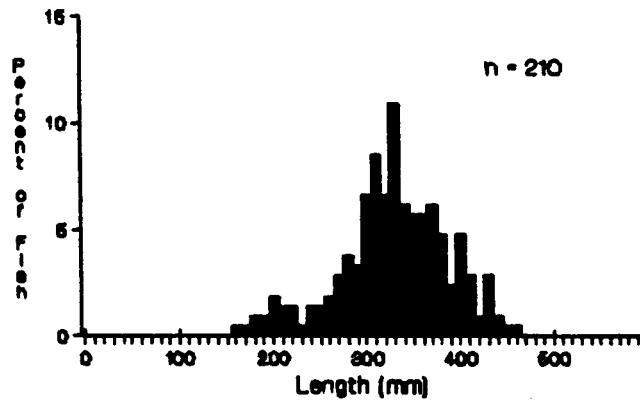


Figure 14. Length frequency of wild cutthroat trout sampled in the Lorenzo section of the South Fork Snake River during October 1989.

LORENZO SECTION CUTTHROAT TROUT 1987



1988



1989

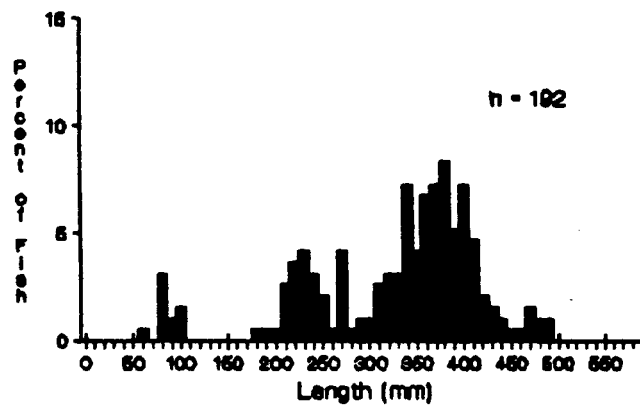


Figure 15. Comparison of wild cutthroat trout length frequencies for the South Fork Snake River at Lorenzo during 1987 through 1988.

The density estimate for cutthroat trout in the Lorenzo section was the lowest for all sample sites (Tables 10 and 11). The density for cutthroat trout has declined from 52 to 19/hectare from 1987 through 1989, a 63% decline. Mean size for age 1+ and older cutthroat trout sampled equaled 352 mm with 18% greater than 405 mm. This compares to a mean size of 338 mm with 10% larger than 405 mm in 1988. The lack of juvenile cutthroat trout again inflates mean size and percent over 405 mm.

Brown trout estimates were completed for juvenile and adult fish (Table 11). Densities for brown trout have declined from 71/hectare in 1987 to 38/hectare in 1989. This decline coincided with low winter flow releases from Palisades Dam from 1987 through 1989.

Salvage

At the Palisades Dam stilling basin, we salvaged 144 trout and 41 whitefish (Table 12). Brown trout were the most abundant species captured and comprised 62% of the trout caught. Lake trout (35%), cutthroat trout (2%), and rainbow trout (2%) were also captured. Palisades drawdown was not as severe in 1989 as in 1987 and 1988. Fewer lake trout and no hatchery cutthroat trout were salvaged, compared to prior years. Several days prior to salvage, flows were cut off in the stilling basin, which may have affected fewer fish caught in 1989 as compared to prior years.

Brown Trout Spawning Surveys

We counted a total of 574 brown trout redds during the 1989 flight, a slight increase over 1988 (Table 13). Counts were highest in the Palisades Dam after-bay (117) and in the Conant Valley (106) and Canyon (215) sections, normally the areas with the greatest numbers. As in 1988, flows were reduced to 20.7 m³/s in early November 1989, which appears to have shifted spawning distribution within reaches. The continued large number of redds counted in the after-bay suggests that opening of the tailrace to fishing in 1988 has not drastically reduced the brown trout spawning population in this section. Continued superimposition of brown trout redds in the after-bay indicates a surplus of spawners still exists, based on available spawning areas. Counts were delayed 10 days in 1989 due to poor flying conditions. Fog at the dam and river icing from Lorenzo downstream impacted visibility.

Table 12. Comparison of salvage records for the Palisades Dam stilling basin from 1981 to 1989.

Date	Species composition						
	Brown	Lake	Wild Cutthroat	Wild Rainbow	Rbt/Ct Hybrid	Whitefish	Hatchery Cutthroat
10/05/81	152	257	17	--		b	9
11/01/83	314	55	54	--		b	a
10/04/85	61	50	7	--	1	b	a
10/10/86	427	33	10	2		b	16
10/27/87	108	171	16	--		83	4
10/18/88	139	104	48	2		106	a
10/17/89	89	50	3	2		41	--

^aHatchery fish not distinguished from wild fish.

^bWhitefish not salvaged.

Table 13. Brown trout redd counts on the South Fork Snake River, 1982 to 1989.

Section	Length (in km)	12/ 198	12/20 1983 ^a	12/4 1984	12/1 1985	12/5 1986	12/4 1987 ^b	12/5 1988	12/18 1989 ^c
After-bay of Palisades	0.8	90	49	75	179	294	70	199	117
After-bay to Irwin	11.2	--	--	51	143	20	2	15	--
Irwin to Conant Valley	15.8	4	4	8	65	46	103	8	106
Conant Valley to Burns Creek	16.2	120	96	37	143	311	133	216	215
Burns Creek to Anderson Diversion	20.6	57	9	51	8	62	47	39	61
Anderson Diversion to Heise Bridge	5.6	--	--	7	5	--	7	2	--
Heise Bridge to Mouth	30.4	<u>NC</u>	<u>NC</u>	<u>23</u>	<u>65</u>	<u>67</u>	<u>168</u>	<u>66</u>	75
Totals	100.6	271	158	252	608	809	530	545	574

^aCounts should be considered low due to poor visibility from fog.

^bLater flights indicated fish spawned later in 1987 than previous years.

On December 14 in the after-bay 105 redds were counted versus 70 on December 4.

^cLate counts due to weather cancellations, fog at dam, ice below Lorenzo.

Willow Creek Tributaries

Several years of drought and resultant low water flows in Willow Creek made comparison of 1989 trout densities to 1983 observations difficult. In some areas, habitat conditions had obviously changed from 1983 to 1989. Trout densities and comparable 1983 observations are shown in Table 14.

Cellars Creek

One transect (1.11) on lower Cellars Creek, from Corsi's 1983 inventory, was selected for evaluation. Both brown trout and cutthroat trout were collected in 1983 and 1989; however, brown trout were present in higher numbers and comprised a larger percentage of the trout population than in 1983 (1983, 6% - 1989, 42%). Trout densities were reduced overall in 1989. Young-of-the-year were not collected in 1983 or 1989.

Corral Creek

The total number of trout in one transect near Brockman Road was nearly two times higher in 1989 than in 1982, but the increase in total trout numbers was weighted by a 175% increase in young-of-the-year (age 0+) trout. The number of age 1+ and older trout was only 17% of the number seen in this transect in 1982.

Table 14. Species composition and densities of trout in Willow Creek tributaries in 1989 and prior years.

Stream	Species ^a	Trout ^b per 100 m ²			
		Age 0+	Age 1+ and older		Total
Cellars Cr.	Cutthroat (58%) Brown (42%)				6.6 (9.6)
Corral Cr.	Cutthroat (100%)	25.7 (9.2)	0.75 (4.3)		26.2 (13.6)
Lava Cr.	Cutthroat (100%)	28.8 (13.5)	5.90 (6.6)		33.5 (20.4)
Homer Cr.	Brook (100%)		No estimate		
Sawmill Cr.	Cutthroat (100%)		No estimate		

^aPercentages of total number of captured trout by species shown in parentheses. Population estimates by species were not possible for Cellars Creek.

^bEstimates in parentheses for prior years-Cellars 1983, Corral 1982, Lava 1984.

Habitat quality in Corral Creek appeared to have declined from 1982 to 1989. Heavy grazing had cropped riparian vegetation to the ground and substrate fine sediments appeared to have increased.

Lava Creek

Of the three tributaries in which meaningful population estimates were possible, Lava Creek had the most similar densities in 1989 to those observed in the early 1980s. Habitat quality was also most similar in Lava Creek, compared to earlier observations from 1982 to 1984.

Total numbers of trout were up by 64% in 1989 (from 1984). Again, the increase in total number was due to a large increase (113%) in the number of age 0+ trout from 1984 to 1989. The number of age 1+ and older trout declined from 1984 to 1989 by 11%. Habitat quality was better than observed in other Willow Creek tributaries. Now stream flows appear to be the most serious habitat limitation in Lava Creek.

Homer Creek

A population estimate was not completed on Homer Creek. Flows in 1989 were extremely low, with most habitat represented in pools upstream of beaver dams.

Sawmill Creek

Increased beaver activity inundated the 1983 study area selected for comparison. Because the transact could not be clearly identified and could not be adequately sampled, an estimate was not completed for Sawmill Creek.

Snake River

Reward Tag Program

Sportsmen returned 114 reward tags from the Snake River in the Idaho Falls vicinity and 130 tags from the Gem State Reservoir through July 25, 1990. Return rates for fish stocked at different times in 1989 varied from 18% to 46% in the Idaho Falls area and 20% to 46% in the Gem State Reservoir section (Table 15). A major portion of the returns in both areas occurred during the winter and spring of 1990, indicating a good holdover potential for catchable rainbow trout. Fish released in April had the poorest return-to-the-creel, based on tag returns. These fish were released just prior to runoff. High water may have affected survival or migration downstream out of the study area.

Of the tag returns for rainbow trout released in the Gem State Reservoir, 41% were captured below the dam. We released rainbow trout at two locations in the Gem State Reservoir section. The western release site was about 150 m upstream of the dam. We believe this release site was too close to the dam, resulting in outmigration through the dam.

Lukens (1988) estimated return-to-the-creel of only 8% in the Idaho Falls vicinity during the season of release. Based on tag returns, we estimated a 19% return of hatchery rainbow trout during 1989, plus an additional 13% in 1990. We believe more frequent releases and news articles publicizing hatchery releases have improved return rates. Gem State Reservoir was not complete during Lukens' study.

Table 15. Tag return data (percentage) for hatchery catchable rainbow trout released in the Snake River near Idaho Falls in 1989. (Releases made in the Gem State Reservoir and Idaho Falls vicinity. Returns broken down by 1989 and 1990 captive periods.)

Date released	Percent returns					
	Idaho Falls area			Gem State Reservoir		
	1989	1990	Total	1989	1990	Total
March 28	36	10	46			
April 29	12	10	22			
April 21				14	6	20
April 21 ^a				22	10	32
April 26	10	8	18			
June 23				24	22	46
July 26				26	20	46
July 31 ^b	24	16	40			
July 31	18	14	32			
August 25				20	18	38
August 29	12	18	30			
September 19				12	28	40
September 20	24	16	40			
October 3	--	--	--	--	--	--
Average return rate	19	13	32	20	17	37

^aHatchery records indicate April release, but we believe to be a March release.

^bHatchery records indicate July release, but we believe to be a June release.

DISCUSSION

Falls River Drainage

Falls River

Densities and length frequencies of trout sampled below Kirkham Bridge are representative of a healthy and productive wild trout population. Length frequencies of trout above and below Kirkham Bridge are indicative of habitat differences noted during the survey. Deep water holding and rearing habitat - pools, runs, and other in-stream production cover - is more abundant in the lower river section.

Habitat quality throughout the inventoried river reach, Sheep Falls to the Enterprise Canal, is currently excellent. Little or no disturbance throughout the reach was noted. Habitat differences noted above and below Kirkham Bridge are natural features of the river associated with river width and bedrock substrate.

Severe dewatering occurs below Enterprise Canal due to irrigation withdrawals. Water quality is marginal for salmonids in this section during late summer in low runoff years. Cursory creel checks and angler interviews (no data available) indicated management goals for Falls River (1 trout/h catch rate) are being achieved. We believe catch rates are greater than 1/h and are supported entirely by wild trout. Angling effort and harvest appear to be lower than for other quality trout waters in the region. Under continued levels of angling effort, mortality, and habitat quality, Falls River should continue to produce good numbers and sizes of wild trout.

Increased angling effort should be expected, and two hydroelectric project proposals pose an unknown risk to existing habitat quality. Maintenance of the existing high quality wild trout fishery will likely hinge on our management of future increases in angling effort and mortality. Falls River merits further population monitoring within and above the affected reaches of the proposed hydroelectric projects to Sheep Falls. The quality of the existing wild trout fishery makes Falls River an appropriate candidate for management under a future wild trout regulation.

Hatchery Trout Evaluation

The estimated return-to-the-creel of catchable rainbow trout stocked in the Falls River was well below the 40% minimum return rate used by the Idaho Department of Fish and Game (Department) to evaluate acceptable utilization of hatchery catchable trout. Of the four groups of Falls River catchables released in 1989, those from the late June release returned to the creel best at 17%, compared to the overall return of 10%.

Considering the poor utilization of catchables in the Falls River and the excellent quality of the existing wild trout fishery, there is little justification to continue stocking catchables in Falls River.

Conant and Squirrel Creeks

Both Conant and Squirrel creeks are supporting wild trout populations at moderate or low densities. The predominance of brook trout in both streams

suggests some factor or factors limiting the utilization of the streams by river trout populations for spawning and rearing of fluvial progeny. In Squirrel Creek, migration barriers were identified which likely prevent movement of spawning trout from the river to good quality spawning and rearing habitat. Removal of those barriers in Squirrel Creek and improvement of habitat in Conant Creek would improve the potential of these streams to produce recruitment to the Falls River fishery and improve the resident stream fisheries at the same time. Because both stream drainages are predominantly privately owned, habitat improvements would require cooperative agreements with adjacent landowners.

Island Park Reservoir Tributaries

Trout populations are dominated by brook trout in the surveyed tributaries. Habitat quality varies among streams, but on the whole, the potential for improvements in spawning and rearing habitat is present on each stream. The dominance of brook trout in these streams suggests that they currently provide little or no production for the reservoir fishery. A cooperative program of habitat improvements and further survey of possible irrigation barriers between the Department, the Idaho Department of Lands, private landowners, and the Targhee National Forest could develop additional production for the reservoir and resident stream fisheries. Of the inventoried streams, Icehouse and Hotel creeks have the best potential for reservoir kokanee and rainbow trout production.

Henrys Fork

Population Sampling

Box Canyon - In February 1989, the Henrys Fork flow releases at Island Park Reservoir were reduced to 2.5 m³/s (85 cfs). This flow reduction coincided with an Arctic front which lowered air temperatures to -40°C to -46°C, causing severe frazil and anchor ice in the Henrys Fork. Ron Smith, an Idaho State University graduate student studying the Henrys Fork, observed mortalities of smaller rainbow trout in the Last Chance area (personal communication), presumably due to icing impacts. These weak year classes will affect the 1990 and 1991 fisheries. With better water conditions and the catch-and-release regulation, we expect to see recovery begin in 1991.

Mesa Falls to Warm River - Due to limited access, we assume this section of the Henrys Fork provides some insight as to the potential benefits of restricted harvest regulations from Warm River to Ashton Reservoir. Good access and high fishing pressure below Warm River appear to limit recruitment of rainbow trout over 300 mm. The area below Mesa Falls has 31% of rainbow trout larger than 300 mm, versus 20% for the section below Warm River. We believe a 350 mm or 400 mm minimum size restriction would result in increased numbers of larger sized rainbow trout.

South Fork Snake River

During 1989, we continued to see reduced numbers of cutthroat trout 250 mm to 330 mm (age 2+). Based on prior observations and salvage in side channel areas following fall flow reductions, we believe winter flow releases of 20.7 m³/s or less cause significant losses of age 0 and possibly age 1+ cutthroat trout (Elle and Corsi in press). The histogram of age 3 and older cutthroat trout continues to show a shift to larger length classes and was compressed in 1989, compared to 1988 (Figure 12). This is due in part to fewer age 2+ cutthroat trout recruiting. With the exception of the Lorenzo section, the length frequency information shows few age 1+ (180 mm to 250 mm) cutthroat trout

present in 1989. We continue to observe top-heavy cutthroat trout populations with juvenile recruitment missing. Although overall densities remain consistent or have increased under special regulations, prospects for the future two to five years are questionable due to limited recruitment.

In the Lorenzo section, we continued to observe a trend of declining cutthroat trout densities in 1989. After reviewing the benefits of the restricted harvest cutthroat trout slot limit in the Palisades and Conant Valley sections, we will recommend extending the regulation to the South Fork downstream of the Heise measuring cable beginning in 1990.

Based on electrofishing estimates, brown trout densities have remained stable in the Lorenzo area, but have declined in the upper river sections. However, redd counts as an indicator of the number of brown trout adults have been relatively constant from 1987 through 1989. We believe some of the density changes observed in electrofishing samples are related to changes in the sampling date for Conant Valley and Palisades sections. We do not expect to see reduced numbers of brown trout due to losses of juvenile related to flow reductions in 1987 and 1988.

Willow Creek Tributaries

Despite the large number of cutthroat trout young-of-the-year (age 0+) observed in Corral Creek and Lava Creek, the status of cutthroat trout in the surveyed tributaries is clearly depressed from the population levels observed from 1982 to 1984. Escapement of spawning cutthroat trout to these two tributaries may have increased due to the seasonal fishing closure during spawning activity, but survival or retention of over-yearling cutthroat trout has declined. It is impossible to partition drought-related mortality from angling mortality to explain the observed decline in cutthroat trout densities. The effects from grazing-induced habitat losses are additional pressures impeding recovery of cutthroat trout in the Willow Creek drainage. The implementation of a restricted-harvest cutthroat trout regulation (2 fish, 8-in to 16-in slot) would likely depend on increased snowpack and improved year-round in-stream flows to provide the benefits to the Willow Creek fishery achieved for the South Fork Snake River.

RECOMMENDATIONS

1. Discontinue all hatchery catchable releases in Falls River due to return-to-the-creel of only 5% to 17%.
2. Require hydroelectric developers to complete additional populations estimates on Falls River to build a data base on reaches proposed for hydroelectric projects.
3. Work with private landowners for habitat improvement projects on Conant and Squirrel creeks in the Falls River drainage.
4. Work with private landowners, Idaho Department of Lands, and U.S. Forest Service for habitat improvements and fish passage projects on Island Park Reservoir tributaries.
5. Evaluate community and angler input regarding possible restricted harvest regulations for the Henrys Fork from Ashton Reservoir to the Riverside Campground.

6. Work with the Bureau of Reclamation, irrigators, and Idaho Department of Water Resources to maintain higher winter flows in the Henrys Fork and South Fork Snake River to reduce fish losses. Actively support funding of a minimum flow study on the South Fork Snake River.
7. Redistribute hatchery catchable releases in Gem State Reservoir to minimize downstream migration through the facility. Eliminate April releases in both Gem State Reservoir and the Idaho Falls area.
8. Continue to develop habitat improvement projects.

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Ron Smith, an Idaho State University graduate student, provided a drift boat and crew for shocking Box Canyon and Mesa Falls to Warm River on the Henrys Fork.

Robert Warren assisted with data entry and analysis.

Denise Brown provided manuscript preparation.

We wish to thank the Henrys Lake Foundation for the financial and manpower support at Henrys Lake for fencing and fish screen construction on Henrys Lake tributaries. Thanks to Brad George for his continued coordination and work on Henrys Lake projects.

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LITERATURE CITED

- Angradi, T. and C. Contour. 1989. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-12, Regional Fisheries Management Investigations. Jobs 7a and 7b, Henrys Fork Fisheries Investigations. Idaho Department of Fish and Game, Boise. 96 p.
- Corsi, C. 1986. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-9, Regional Fisheries Management Investigations. Job 6-c, Willow Creek Investigation. Idaho Department of Fish and Game, Boise. 69 p.
- Elle, S., C. Corsi, and D. Aslett. 1987. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-11, Regional Fisheries Management Investigations. Idaho Department of Fish and Game, Boise. 48 p.
- Elle, S. and C. Corsi. In press. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-13, Regional Fisheries Management Investigations. Idaho Department of Fish and Game, Boise.
- Lackey, R. and W. Hubert. 1977. Analysis of Exploited Fish Populations. Sea Grant - Extension Division, Virginia Polytechnic Institute and State University, Blacksburg, Virginia. 24.061. 172 p.
- Lukens, J.R. 1988. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-10, Regional Fisheries Management Investigations. Job 1, Rivers and Streams Investigations. Snake River Game Fish Populations, Fishing Pressure, and Harvest, American Falls to South Fork. Idaho Department of Fish and Game, Boise. 44 p.
- Platte, W., W. Megahan, and G. Minshall. 1983. Methods for Evaluating Stream Riparian and Biotic Conditions. General technical report INT-138. U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experimental Station, Ogden, Utah. 70 p.
- Ricker, W.E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Fisheries Board of Canada. Bulletin 191. 382 p.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management
Investigations

Project No.: F-71-R-14

Title: Region 6 (Idaho Falls),
Technical Guidance

Job No.: 6(IF)-d

Period Covered: July 1. 1989 to June 30. 1990

ABSTRACT

Technical assistance was provided to federal, state, and local agencies upon request. Technical assistance was also provided to sportsmen's clubs on habitat improvement projects and to private individuals regarding private fish ponds.

Authors:

Steve Elie
Regional Fishery Manager

Charles Corsi
Regional Fishery Biologist

OBJECTIVES

1. To assist the Idaho Department of Water Resources, Federal Energy Regulatory Commission, and U.S. Army Corps of Engineers in evaluating the effects and minimizing the impacts of habitat alterations and diversions of natural flows on fish populations.
2. To provide information to private and government agencies on fisheries and aquatic habitat to assist with habitat restoration efforts.
3. To assist the public with fish pond inquiries.
4. To investigate all fish kills with directives to prevent future kills and to provide data for criminal prosecution where necessary.

METHODS

We responded to requests for data, project reviews, and recommendations for individuals, government agencies, and sportsmen's clubs as time permitted. Meetings were attended and field *inspections* conducted as necessary to formulate responses on a project-specific basis.

RESULTS

During 1990, we responded to requests for technical assistance on water-related issues as follows:

Army Corps of Engineers	7
Bureau of Land Management	8
Bureau of Reclamation	7
U.S. Fish and Wildlife Service	4
U.S. Forest Service	18
U.S. Soil Conservation Service	1
Federal Energy Regulatory Commission (14 projects)	28
Environmental Protection Agency	2
Idaho Department of Health and Welfare, Division of Environmental Quality	6
Idaho Department of Lands	5
Idaho Department of Transportation	4
Idaho Department of Water Resources	25
Idaho Water Resources Board	1
Idaho Outfitters and Guides Board	2
Idaho Legislature	1
District Seven Health Department	2
Idaho State University	2
Bonneville County	1
City of Idaho Falls	2
City of Mackay	1
City of Rexburg	3
Private Fish Ponds (8 projects)	12
Sportsmen's Clubs	11
Private Development	5

Many projects required several days to review and provide comments. In particular, small hydropower projects required multiple days of time by one or more staff to review either proposals or project operations.

The Birch Creek hydropower project again occupied over 10 days of time in renegotiating project bypass flows, dealing with winter ice formation, and reviewing the proposal to treat channel bed loss upstream of the project. The Falls River hydropower project continued to require input and review in the licensing phase. We spent 10 days on this project.

No fish kills were detected in 1989.

In 1989, we cooperated with sportsmen's groups and other agencies on seven habitat restoration projects. We cooperated with the Henrys Fork Foundation, Targhee National Forest, and four landowners on Henrys Lake tributary habitat restoration, including construction of 2 mi of stream fencing on three parcels on Duck Creek irrigation diversion canals. The work was completed using the Idaho Department of Fish and Game's Challenge Grant program. We also planted willow cuttings on 1 mi of Targhee Creek.

In 1989, we began planning the Palisades Creek screen installation with the Bureau of Reclamation. The Bureau of Reclamation has accepted this screening project as off-site mitigation for the Palisades Dam power plant turbine upgrade. The work will be done in the fall of 1991. Activities in 1989 included preliminary design, landowner contacts, and inquiries as to water rights available for fish bypass flows.

We provided input to private landowners who wanted to restore habitat on Medicine Lodge Creek and on Warm Creek (Big Lost River). Input was primarily on in-stream habitat structure design and construction.

Submitted by:

Charles Corsi
Regional Fisheries Biologist

Steve Elle
Regional Fisheries Manager

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME


Steven M. Huffaker, Chief
Bureau of Fisheries
Al Van Vooren
Resident Fisheries Manager